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PROBLEM ANALYSIS

FORAGE ALLOCATION FOR
BIG GAME AND LIVESTOCK
IN NORTHEASTERN OREGON

Submitted to: Range and Wildlife Habitat Laboratory
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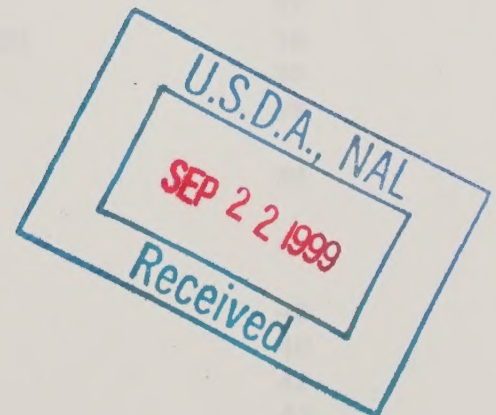
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I would like to thank all the individuals who took the time to express their views as interested and concerned individuals or agency representatives. A list of individuals is presented in Appendix A.

Appreciation is expressed to Dr. Jack Ward Thomas and the Pacific Northwest Forest and Range Experiment Station, USFS, for seeing the need for and providing funds for this study.

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ATTACHMENTS

I would like to thank all the individuals who took the time to express their views on the issues and concerns individuals or agency representatives. A list of individuals is provided in Appendix A. Appendix B is provided to the Department of the Interior and the Pacific Northwest Forest and Range Experiment Station, for using the report for and providing funds for this study. Special thanks to the individuals for continued assistance throughout the study.

Very truly yours,
[Signature]



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INTRODUCTION

Historically, large herbivores have evolved on most of the lands in the western United States. In fact, Skovlin (1979) has stated that cervid distribution extended from the eastern to western seaboard and from the Canadian border southward to near the Mexican border. Prior to the coming of European man to the American continent, large herbivores were free to occupy any type of habitat that met their requirements. Seasonal movement to escape severe winter weather, hot summer temperatures or poor forage conditions were essentially unrestricted except for occasional light harrassment by the Indian population.

As European man inhabited, then spread westward across the American continent and brought with him a rather intensive system of agriculture, the pristine environment and the ability of a herbivore to have unlimited choice of habitat came to an end. Seasonal patterns of use were also disrupted by the presence of human habitation; the extensive grazing of livestock, control of natural fires and timber harvest.

Seton (1927) estimated that 67,135,000 Animal Units of native large herbivores inhabited the United States prior to the coming of European man (Table 1). He did not include the numbers of feral horses that spread across the west quite rapidly as a result of escape and release by early explorers. Stoddart, Smith and Box (1975) have stated that the number of domestic livestock animal units on these same lands today closely approaches this figure. Additionally, today in twelve western states there are 14, 657,868 animal units of large wild herbivores present (Public Land Law Review Commission, 1969) (Table 2). Again, feral horses were not included in these figures, so additional animal units exist on many ranges. It can be seen, then, with little difficulty, that today in the western United States the land base is

Table 1. Numbers of big-game animals estimated to have been present originally in the United States. -Data from Seton (1927)

Animal	Numbers	Number per Animal unit (455-kg base)	Animal Units
Bison	50,000,000	1.0	50,000,000
White-tailed deer	40,000,000	7.7	5,195,000
Pronghorn antelope	40,000,000	9.6	4,167,000
Elk	10,000,000	1.9	5,263,000
Mule deer	10,000,000	5.8	1,724,000
Black-tailed deer	3,000,000	8.0	375,000
Bighorn sheep	1,500,000	5.6	268,000
Mountain goat	1,000,000	7.0	143,000
Total	155,500,000	---	67,135,000

Table 2. Animal-Unit Month (AUM) equivalents of big-game populations in 12 western states, 1966. -Data from Public Land Law Review Commission (1969)

State	AUMS	State	AUMs
Arizona	487,744	New Mexico	790,801
California	1,641,727	Oregon	2,775,463
Colorado	1,048,705	South Dakota	1,237,819
Idaho	1,414,487	Utah	650,825
Montana	1,556,809	Washington	1,362,068
Nevada	397,224	Wyoming	1,294,196
Total		14,657,868	

supporting greater numbers of large herbivores (both domestic and wild) on considerably fewer available acres.

AREA DESCRIPTION

The area covered in this report entails the physiographic province of the Blue Mountains (Figure 1). The Columbia Basin province joins the Blue Mountains on the west and at this interface large areas of critical winter range exist (Skovlin and Vavra 1979). Within the mountains are located several block faulted valleys and river basins where critical winter ranges exist in the foothills. Included rivers are the Grande Ronde, Snake, Imnaha, Powder, Burnt, Wallowa, Minam and various forks of the John Day.

Annual precipitation patterns vary with physiography (Figure 2). Winter ranges commonly exist in the lower precipitation zones (10 - 20 inches, 25.4 - 50.8 cm). Seasonal distribution is continental with characteristically dry summers. August - October rains are common and provide regrowth on grasses in about 3 years out of 4.

Maximum migration of elk from the Columbia Basin-Blue Mountain interface is 40 miles (65 km). Elevational changes associated are from 2000 feet (600 m) to 8000 feet (2500 m). Most interior migrations feature less travel (5 to 10 miles, 8 to 16 km) and less elevational change (2000 to 3000 feet, 600 to 900 m) (Skovlin and Vavra 1979).

Winter ranges are quite variable in vegetative composition. At foothill elevations over about 3000 feet (900 m) north slopes covered with mixed pine-fir forest and south slopes with open bunchgrass and scattered pine predominate (North Fork, Middle Fork John Day, Grande Ronde, Snake, Imnaha, Minam, Wallowa Rivers). Lower elevation ranges (below 3000 feet on John Day system, Powder, Burnt Rivers) are grass-

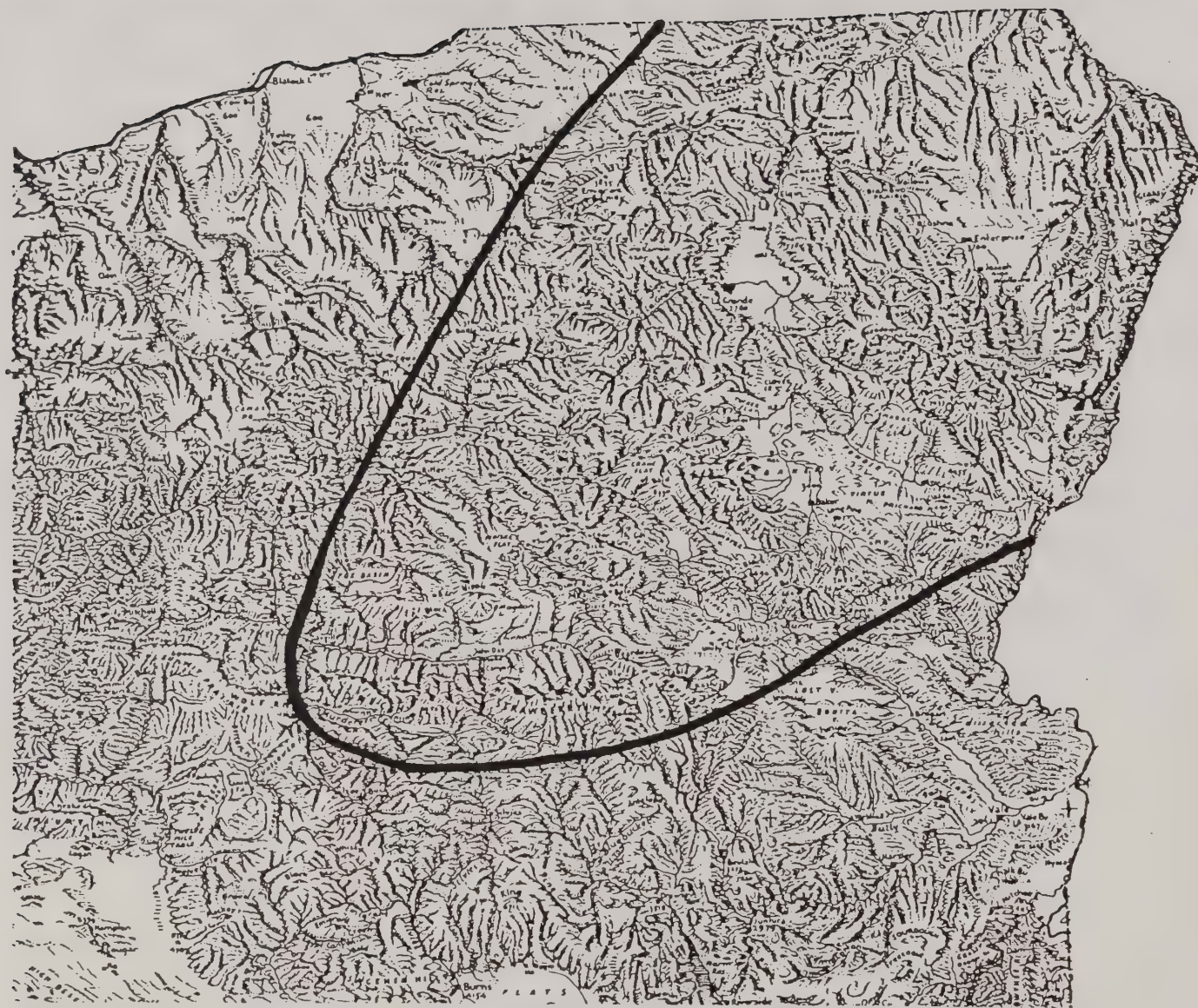


Figure 1. Physiographic map of the study area (from Baldwin, 1959).

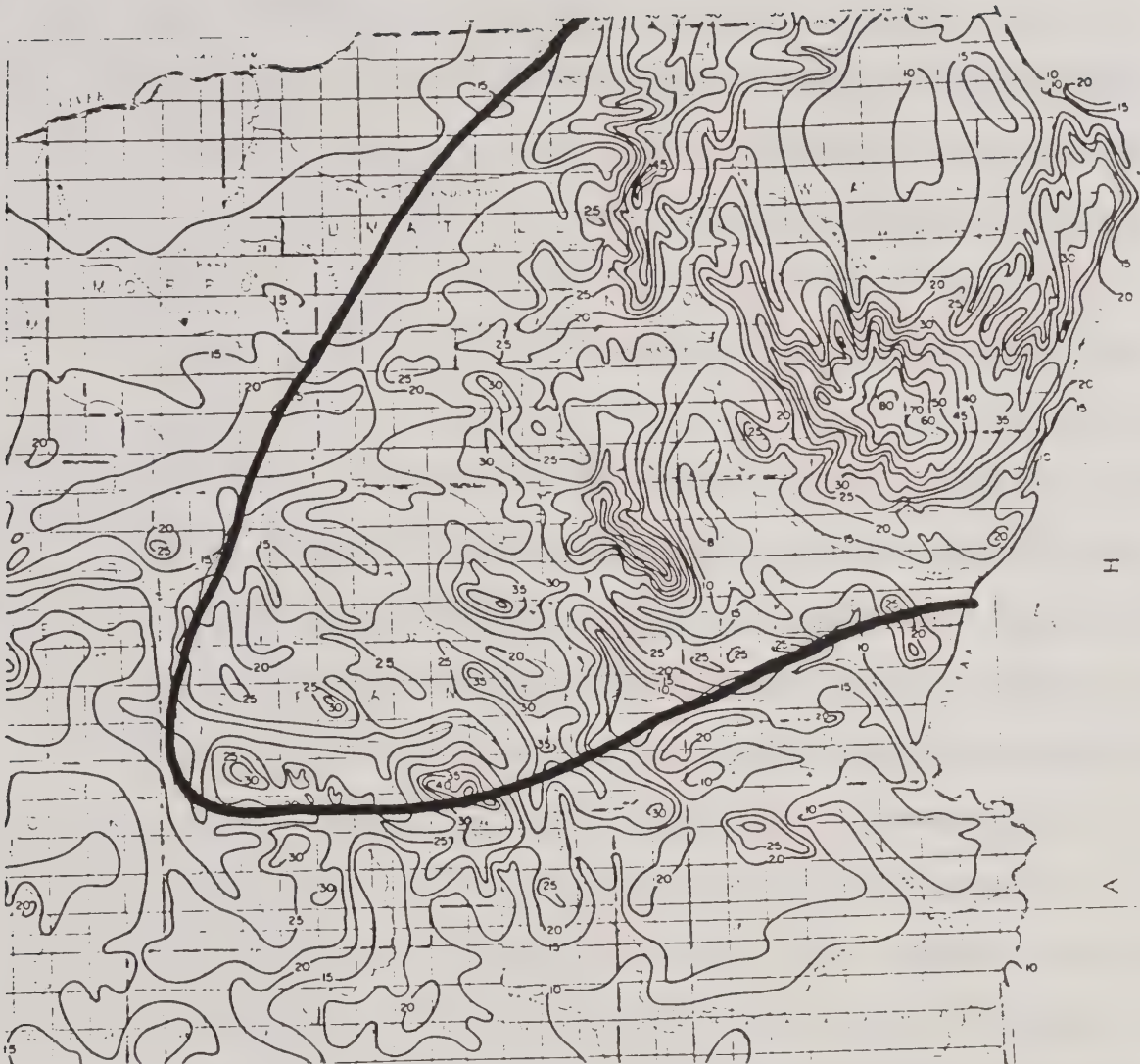


Figure 2. Average (1930-1957) annual precipitation (inches).
(Soil Conservation Service 1964)

lands associated with overstories of juniper and/or sagebrush.

Range condition varies considerably by land-type potential, ownership and past grazing history. Much of these lands are now dominated by annuals (principally cheatgrass). Juniper and sagebrush have also increased drastically in some areas. Many of these ranges have also been heavily invaded by low forage quality plants (yellow star thistle, whitetop, diffuse knapweed, dalmation toadflax, tarweeds, medusahead ryegrass).

Annual migration patterns of deer and elk are variable depending on weather condition, principally snowfall amounts at various elevations. Deer usually precede elk onto winter ranges and remain somewhat longer than elk. Winter ranges provide between 3-4 months of use by big game; the latter month usually takes in the initiation of new growth of grasses and occurs when soils are very moist.

Summer ranges are composed of forested communities interspersed with grasslands, wet meadows and riparian zones. Hall (1973) has classified the various communities of the Blue Mountains and should be consulted for descriptions.

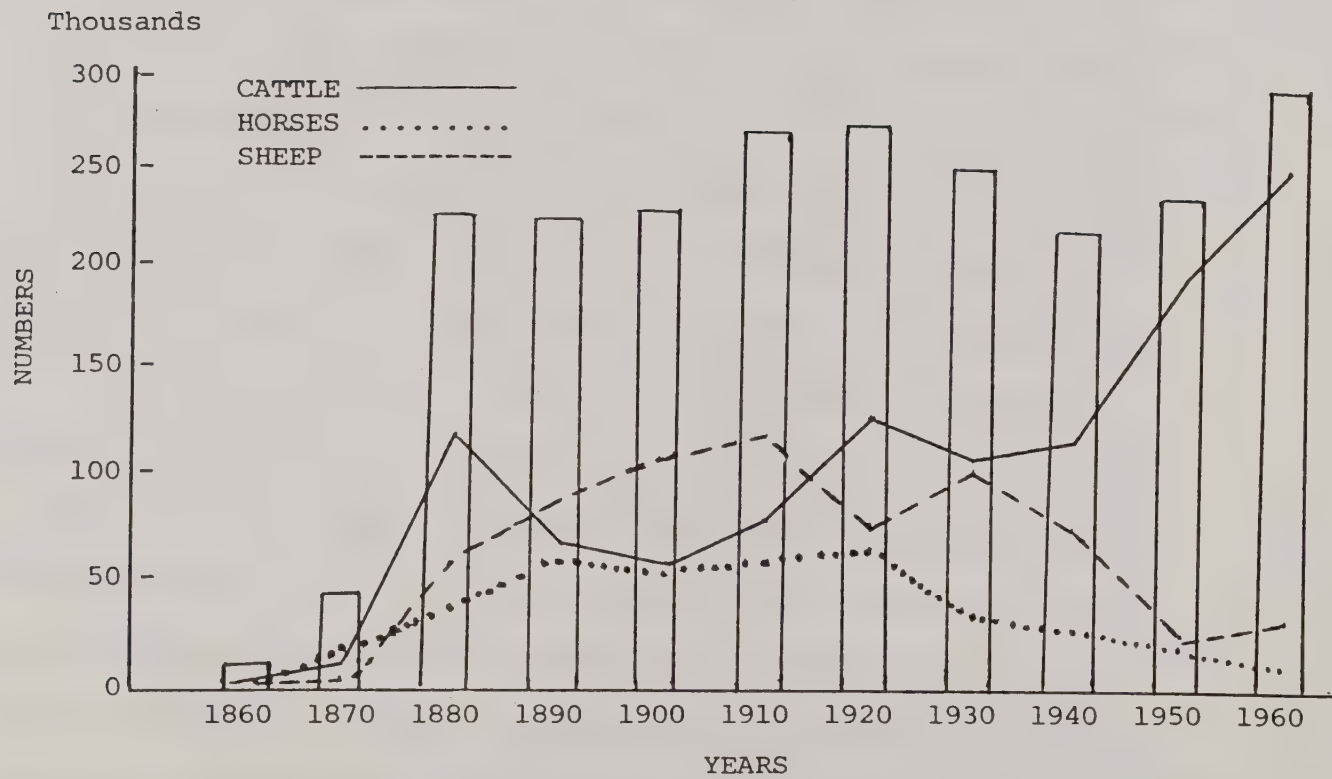
Cattle management is characterized by a winter feeding period and spring-summer-fall grazing on rangelands. The normal feeding period commences in November or early December. However, grazing from October to the onset of feeding is often on meadows that are managed for hay production. Variations occur in local areas. There is some late fall-early winter (November-early December) grazing in some areas (Powder River Basin). Also in the Snake-Imnaha River Basins some year round or 10 month grazing is practiced.

Range turnout occurs in the spring dependent on local forage conditions, but usually between April 15 and May 15, onto foothill ranges. Most cattle are then moved to forested ranges from May 15 to July 1, again depending on the specific range available on each ranch. Cattle are moved off most forested ranges by October 15. Specific to each operation, cattle then again graze foothill ranges or are turned on hay meadows.

Land ownership patterns are stratified to an extent on an elevational gradient. Winter ranges are a mosaic of private and public lands. With the exception of the Imnaha and Snake River Basins, private lands dominate winter ranges. Forest Service Lands usually comprise about 20% of the winter range. In some area Bureau of Land Management lands also comprise winter range. Transitory range (late spring, fall) are again a mosaic of private and public lands; but a much larger percent are public (USFS). Summer ranges are primarily National Forests.

Skovlin has provided a compilation of stock units of cattle, horses, and sheep in northeastern Oregon (Figure 3). In 1960 total animal numbers were at an all time high. Sheep and horses were down considerably but cattle numbers had increased drastically in the 1940's and 1950's. During the 20 years since 1960 cattle numbers have stabilized while sheep numbers declined, then showed an increase in the late 1970's. Even though the total stock units increased from 1940 to 1960, the total stock units grazing in Oregon National Forests essentially remained stable during the same period; 613,716 AUM's in 1940 versus 567,063 AUM's in 1979 (Allman, Clarence, 1980, personal communication). Trends in northeastern Oregon forests are similar (Allman, 1980). The present figures are probably lower by 75 percent compared to earlier grazing intensities. On the Heppner Planning Unit livestock AUM's are

Figure 3. Stock units of cattle, horses, and sheep in northeastern Oregon, 1860 - 1960.^{1/}



^{1/} Stock unit represents one cow or horse equal to five sheep.

today 25 percent of what they were in 1920.

THE PROBLEM

Livestock and big game share common ranges throughout the Blue Mountains of eastern Oregon. Joint use often occurs on summer and fall ranges while winter and spring big game ranges are usually grazed by livestock after big game have migrated. Public land agencies charged with the proper use of the forage resource face the problem of forage allocation for these herbivores while maintaining or improving the forage resources and providing multiple use of public lands. Private land owners are faced with manipulations in their management programs when big game numbers are high or when concentrated on individual properties.

Balancing animal numbers to match available forage appears as the simple solution to the problem. However, while livestock numbers are regulated, determining and regulating big game numbers can be a problem. Unless forage use (on a plant species basis) by each herbivore species is known, then balancing numbers is a rather meaningless endeavor. Food habits by animal species for each season of the year must be determined before forage can be allocated. While pounds of available forage for each herbivore may be the primary concern, the nutritional availability must also be considered so that provisions for animal functions, i.e., maintenance, growth, and reproduction are made. The impact of forage use must be determined as during specific plant growth periods even light use can be detrimental to future plant production and health. Additionally, varied land ownership patterns, land management objectives and the complex mosaic of naturally occurring plant communities confound the problem of allocating forage.

This study, through literature search, interviews and results of ongoing research identifies the current problems in forage allocation, provides the basis for future studies and proposes avenue of research.

OBJECTIVES

1. To identify current problems in forage allocation to herbivores.
2. To identify current knowledge in forage allocation to herbivores.
3. To provide the basis for future studies to determine proper forage allocation on both summer and winter ranges.
4. To propose general avenues of research and develop priorities of research in forage allocation.

PROCEDURE

Addressing the problem and current knowledge of forage allocation was accomplished by interviews with land agency personnel, ranchers, game biologists and other interest groups; review of the scientific literature and current problems and attitudes expressed in the press; and a review of ongoing research. Information and data generated were then integrated into a document fulfilling the proposed objectives.

Interviews

During 1978-79 selected personnel within the Forest Service, Bureau of Land Management and Oregon Department of Fish and Wildlife were contacted and interviewed. Professionals on local, regional and state levels were contacted.

County Extension Agents, ranchers, rancher organizations and sportsmen groups were also contacted. Ranchers interviewed were those

directly involved with grazing livestock : on dual use ranges (both summer and winter ranges) and on public and private lands.

Literature search

The literature search was conducted in three phases. Regional and national scientific publications were searched for pertinent data. Management documents published by state and federal agencies were reviewed. Finally, articles appearing in the popular press covering current problems were reviewed.

Ongoing research

Ongoing research results will be included and gathered through the interview process and by reviewing annual or progress reports.

BENEFITS OF SOLUTION

The immediate solution to forage allocation problems is, of course, that the forage be properly allocated to the various herbivores. However, confounding factors such as land ownership patterns, management objectives and the ability to distribute animals properly creates a very complex issue.

Extensive use of private lands by big game occurs seasonally in northeastern Oregon. Deer and elk graze both cropland and native range. Proper forage allocation on private lands would include proper distribution of deer and elk to minimize damage in any given area. Rancher tolerance to big game should then be improved. Also rancher-sportsman-Oregon Department of Fish and Wildlife relations should be improved. On public lands proper allocation of forage would result in the perpetuation of the forage resource and realization of the multiple use concept.

Allocating forage on winter ranges poses a particular problem

since it is these ranges where the mosaic of public-private land is greatest and where variations in winter climate can cause significant changes in the annual distribution of deer and elk. Proper allocation on winter ranges would provide for better survival of deer and elk through the winter, better fawn and calf survival, better reproduction and generally better herd health. Annual fluctuations in populations due to winter die-offs may be decreased thereby leading to more consistent hunting seasons and increased sportsman satisfaction. Proper allocation of forage should also decrease damage to croplands and haystacks during most years.

Carrying capacities of livestock and big game could be maintained at present levels and increased in the future on most winter ranges if range condition could be increased. Most winter ranges suffer from the effects of past heavy grazing and are now dominated by annuals. Improved range condition (also an increase in pounds/acre of forage) also provides a cushion for future expansion of the herbivore resource.

If possible, proper allocations of forage should entail distribution techniques, range improvement where necessary, and other management tools to prevent decreases in the present number of both domestic and wild herbivores. Granted, specific areas may have to undergo decreases in the number of one or of all herbivores to maintain a satisfactory range condition. However, large decreases in animal numbers, as an easy solution to the problem, would only generate resistance from the various interest groups.

INTERVIEWS

Organization of the interview section will be a summarization by profession, by locations. Interviews were conducted in Wallowa, Uma-

tilla, Grant, Baker and Union Counties. The four main groups interviewed and involved were ranchers, Oregon Department of Fish and Wildlife, County Extension Agents and Forest Service staff officers with the Wallowa-Whitman, Umatilla and Malheur Forests and Region-6. Additionally, interviews were conducted with a wildlife biologist, Bureau of Land Management; representative, Isaac Walton League; and game warden, Wyoming Department of Fish and Wildlife. Included also is a summary of an Oregon Rangelands Committee meeting held on forage allocation problems. Individual interviews are presented in Appendix B.

Response of various interviewees was quite variable in detail of response and interest. A tabular summary of the responses of the four main interest groups is presented in Table 3. Interviewees were not asked to respond to the individual items; rather it was hoped that the individual's response was his feelings on the subject and not one prompted from him by the interviewer.

Ranchers

Rancher problems were somewhat variable dependent on the location of the ranching enterprise in relation to big game seasonal ranges. The most common problem mentioned was winter and spring forage consumption on private land. Extended spring use when the forage was greening up was the most critical. Trampling damage at this time was important too. Dependent on area, both deer and elk are mentioned as culprits. In some areas, summer use by elk on lower elevation private and public lands has been increasing either because of increased game numbers or disturbance on traditional summer ranges. Grazing systems may help concentrate elk on the rested or deferred pastures nullifying the rest or deferment. Riparian areas are damaged in some cases.

Table 3. Summarization of interview results.

	Number addressing specific item			
	Ranchers	Extension Agents	Ore. Dept Fish & Wildl.	USFS
Animals involved				
cattle-deer	2	-	1	-
cattle-elk	11	2	3	6
cattle-elk-deer	2	3	4	1
Land type				
range				
summer	8	2	5	5
winter	12	4	8	5
early spring forage	12	5	8	2
trampling	4	2	-	3
Cropland	5	1	1	-
Animal factors (not specific to animal species)				
distribution	12	2	5	6
forage use	11	5	5	7
numbers	10	2	5	2
census methods	5	1	-	1
Grazing systems				
detrimental	1	-	1	-
effects unknown	1	1	1	4
Logging				
too much	-	-	2	-
not enough	1	1	-	-
effects unknown	1	-	1	1
Quantify utilization	3	3	5	7
Total of interview group	15	5	8	7

Crop damage is reported in some areas where cropland is adjacent to forested areas used as summer and fall range by big game.

Ranchers feel that in many areas, ODFW Management Objectives are not being followed and there are too many deer or elk, depending on the area. Some also feel that local biologists are doing their job but that the Portland Office is insensitive to or unaware of problems in eastern Oregon. Reluctance of the Forest Service to enter the controversy was also mentioned.

Among research possibilities, improvements of winter range use would be the highest priority. Decreasing use of private lands or improving distribution so that use was minimized in any given area were two approaches mentioned. Quantifying the impact of deer and elk use in the spring needs to be accomplished. Alternatives to grazing private lands should be explored; i.e., feeding programs, fencing or better distribution or non-entry to private lands. Adequate methods of censusing need to be developed. Stocking rates for big game on all seasonal ranges should be developed so that big game do not overimpact ranges (riparian zones, rested pastures).

County Extension Agents

County agents were in agreement that winter and particularly spring grazing by big game was the most critical issue in forage allocation. Physiological damage, delayed growth and decreased production of grass species and trampling damage all occurred as a result of deer and elk use. Private lands appear to be the main source of winter and early spring forage for big game in many areas.

Research should include range improvement and distribution of big game on winter ranges. Monitoring of vegetation trends and use by live-

stock and big game on winter ranges is needed. Soil compaction due to trampling needs to be documented and quantified. Markgraf of Baker County gave an extensive list of suggestions of needed research.

The Extension Service was responsible for distribution of a survey of game damage to ranchers in Oregon. The Oregon Cattlemen's Association prepared the survey and summarized the results. A summary of that survey is presented in Table 4.

Oregon Department of Fish and Wildlife

Personnel of the ODFW were in agreement that forage allocation problems existed. Distribution of deer and elk on both summer and winter ranges is a high priority concern. The problem of early spring forage consumption by elk on private lands is compounded by poor distribution; i.e., large numbers of elk concentrated on small areas. Using salt to improve distribution was suggested. Alternative winter range concepts should be studied. Fall fertilization and controlled burning, both done to enhance the production of fall regrowth to improve winter forage conditions were two methods suggested.

Cattle numbers were too high during specific time periods on some ranges. Fall cattle grazing on big game winter range should be discontinued or curtailed.

A high priority research item was the influence of logging, increased roading, increased traffic (logging and recreation) and a general increase in disturbance to big game on public lands. It was suggested that these activities had shifted the patterns of elk use on summer and winter ranges increasing the use of private lands which are quiet. Logging of timber stands on public land and the resultant loss of cover were thought to compound the problem of forage use by elk on

Table 4. Results of Oregon Cattlemen's Association survey of private landowners contribution to big game in Oregon.

County	Number of surveys received	\$ value of crops utilized			\$ value of pasture used by			(Misc.) \$ Repairs	\$ Total Cost
		Acres	Grain	Hay	Other	Deer	Elk		
Baker	42	97,149	12,840	39,430	4,660	29,968	18,761	5,967	111,626
Clatsop	6			6,000	150	800	10,120	2,775	19,845
Coos				495	500	18,630	50	2,250	21,925
Crook	25	410,170	13,120	68,985	5,336	147,800		19,950	255,191
Columbia	11	2,626	760	9,120	3,500	593	11,076	1,440	26,489
Gilliam	18	110,740	17,981	15,320	520	31,270	2,045	3,645	70,781
Harney	33	212,572	14,400	55,524	-0-	43,500	3,750	11,832	129,006
Jackson		17,903	300	4,200	200	5,545	870	1,620	12,735
Klamath	-0-								
Lake	13			8,200		12,860		2,160	23,220
Lincoln	5	684		225	Antelope	1,040	1,680	160	1,040
Malheur	25	159,038	1,125	58,970	6,000	231		5,525	8,296
Morrow	29	264,152	19,997	46,500	3,265	23,551		3,050	92,436
Polk	8	6,149	3,010	2,230	20,000	77,787	18,307	335	165,641
Curry				80		5,260		575	30,835
Umatilla	72	387,154	27,604	38,943	8,990	2,160	145,392	30,732	2,815
Union	34		8,550	12,700	2,600	67,770	57,770	11,680	319,431
Wallowa	87	309,864	80,838	38,857		22,550	200,075	41,405	115,800
Wasco	20	64,651	33,887	8,452	10,650	97,705	600	3,460	458,880
Wheeler	35	283,025	17,435	117,055	1,875	18,735	1,900	11,090	75,784
Jefferson	2	17,000	800	2,600	500	69,485			218,840
						2,400			6,300
Total	465	2,342,877	252,647	533,886	68,746	679,640	472,396	159,651	2,166,916

all ranges.

The initiation of grazing systems, particularly rest rotation, may be causing changing patterns of elk use and intensifying big game use on rested and deferred areas. Also, in rather large pastures under rest rotation, deer may be forced to consume sub-requirement diets late in the summer and fall during the season long cattle grazing treatment.

Some personnel indicated that food habit studies of big game and livestock be incorporated to better improve forage allocation decisions. The year round nutritional requirements of big game and the quality of the forage available under varying conditions were also mentioned as important research items.

Forest Service

Forage allocation to cattle and elk on all seasonal ranges is the primary issue. The influence of cattle grazing systems on elk distribution and forage consumption ranked high in importance as well.

Winter range aspects that may require research are as follows:

- 1) Does trampling of spring range lead to long term soil compaction and decreased forage production?
- 2) What are the influences of spring-fall cattle grazing on deer and elk winter ranges?
- 3) Are there range manipulation and improvement techniques available for winter ranges?
- 4) What is the influence of early spring grazing on individual plants?

The research problems associated with summer range are:

- 1) Can elk on summer range be distributed by various means (salt)? Is any kind of elk management possible?

- 2) What are the influences of cattle grazing systems on elk distribution and forage use?
- 3) What are the food habits of livestock, deer and elk?
- 4) Do elk seriously impact riparian zones?

Miscellaneous

Isaac Walton League Representative, Loren Hughes questioned the extent of logging operations in northeastern Oregon and particularly associated road construction. Displacement of wildlife and livestock due to roading and resultant harrassment and the loss of habitat involved were important points. Forage allocation on winter ranges is now a problem and may increase.

Matt Kniesel, wildlife biologist, BLM, suggested research into deer and cattle distribution, food habits and nutrient requirements. Habitat improvement and manipulation were also important research items. The evaluation of summer range and its importance to winter survival of game animals needs investigation.

Charles Oakley, Game Warden, Wyoming Department of Fish and Wildlife, stated that problems of forage allocation similar to Oregon's, existed in Wyoming. Intensive winter feeding programs were underway but the most viable approach seems to be the purchase of key winter range areas and managing the forage primarily for game animals.

The Oregon Rangelands Committee formed a sub-committee to look into the following:

- 1) Develop, in conjunction with ODFW, a procedure that would allow local units of government and citizen groups to participate in the process by which goals for big game herd population levels

are derived.

- 2) Develop a recommendation for a method of monitoring range-land conditions with respect to big game utilization. Such a method would involve SCS and OSU Extension personnel.

LITERATURE REVIEW

Scientific Literature

Cole (1971) theorized on ungulate use and their effects of winter ranges. When ungulates were allowed ecologically complete habitats - complexes of physiographic sites such as bottomlands, upland swales and different slope exposures and interspersions of different vegetation types and plant successional stages - they have little control over succession and range trend. Such would have occurred in the pre-European man western United States. However, when ungulates are artificially concentrated or restricted from using habitat units that are essential to natural equilibriums, secondary succession (regression) can occur and lower the carrying capacity of the range and lead to interspecific and intraspecific competition. Artificial concentration and restriction occurs today due to intensive agriculture, human habitation, logging and harrassment due to such factors as roads and recreation.

The influence of elk on their environment is best documented in the controversy surrounding the Jackson Hole elk herd. Casebeer (1961) stated that the Jackson Hole elk herd once migrated 100 to 200 miles annually. Settlement halted this migration; concentrated elk on limited winter range and led to reduced winter forage and starvation. The Jackson Hole elk feeding program resulted. Also 200,000 acres of range were set aside for exclusive winter range for elk. Severe hedging of browse

and decline of perennial grasses still occurred until only remnants were left. Trampling damage and resultant erosion further decreased the carrying capacity. Transitory ranges have also been degraded due to earlier elk migration in search of forage. Croft and Ellison (1960) also stated that trampling damage was the most serious effect of elk on overstocked ranges. Smith (1961) reported increasing demands for range use by livestock growers and pressures by sportsmen and recreationist created a need for understanding the degree of competition between livestock and big game. Smith concluded that competition for forage existed in Jackson Hole between cattle and elk where use patterns overlapped. He also stated that concessions were made in range use to favor the maintenance of game populations. Range deterioration has continued on game only ranges and conservation and multiple use concepts on public lands could only be maintained if a reduction in the elk herd was made.

Gruell (1973) refutes much of these data and reported that the elk have evolved with this range and that "damages" have always, even prior to the coming of European man, been a natural part of the ecosystem. Since elk use is an evolutionary event, the influence on plant communities is natural. Erosion and watershed conditions are natural and geologic in the Jackson Hole area. Beetle (1974) termed this the "Zootic Disclimax Concept" and refuted the findings of Gruell (1973) on the basis that climate alone should be the criterion for evaluation of range condition. Despite the viewpoint taken, it is obvious that even on exclusive elk use ranges, controversies exist. On multiple use ranges and private lands, such as occur in eastern Oregon, it can be seen that big game grazing is potentially an even more volatile issue.

For proper allocation of forage, food habits of each ungulate considered must be known. Extensive citations are available that list the various food items in deer, elk and livestock diets. Leege, et al. (1976) summarized the literature on food items in elk diets and listed their relative value by season. In most areas, spring diets were composed of at least 85 percent grass.

Summer diets contained forbs, deciduous leaves and shrubs as grass species matured and dried. In the fall shrubs were more important and if fall rains and subsequent "green-up" of grasses occurred, they were again consumed in greater quantities.

Elk were quite versatile in the winter - in northern Idaho on shrub dominant ranges, shrubs were the most commonly consumed food item; in Montana grasses were important; conifers may also be consumed. Elk in winter prefer grasses however, according to the authors. In the Blue Mountains, Korfhage (1974) found that elk consumed primarily grasses and sedges in late spring and early summer, then shifted to forbs and browse as the summer progressed. Browse consumption was surprisingly high in summer (25-45% of the diet). Retention of succulence by different species appeared to be an important factor in elk preference. In mid-summer elk shifted from grassland to forest community feeding sites. Kufeld, et al. (1973) provided similar data for mule deer. Food habits studies in eleven western states indicate that deer diets varied tremendously by season, location and most importantly, due to forage availability (Table 5). Diet composition of cattle and sheep has been summarized by Theurer, et al. (1976). The authors summarized diet composition as well as herbage composition (availability). Cattle

Table 5. Food habits of mule deer by season, summarized from 11 western states (taken from Kufeld et al. (1973)).

Diet constituent (%)	Winter	Spring	Summer	Fall
Grass	0- 53	4-64	0-11	2-24
Forb	0- 43	0-43	3-66	7-78
Shrub	27-100	6-92	12-95	3-97

showed a preference for grass when available but would switch to the other classes. Sheep showed less preference for forage classes; but more on an individual species basis, indicating greater diet selectivity.

Comparative food habits and patterns of use have been reported by various scientists throughout the western United States. Stevens (1966) reported that there was some competition for forage between cattle and elk in Montana but that they mostly complimented each other for efficient range use. In forested zones, elk use grasses earlier in the year and considerable regrowth occurred before the cattle were turned out, so forage was not limited. In the grassland zone, cattle consumed forage that was similar to that consumed by elk in winter. However, cattle use was restricted (voluntarily) to the drainage bottoms and lower slopes. Elk winter range was located on the ridgetops and southern exposures that saw little cattle use. Sheep grazing of parts in the forested zone tended to move elk off the grazed parks. Diets of sheep and elk were similar in June and July.

Mackie (1970), also working in Montana, reported that in the spring and fall, elk and cattle diets were similar. In summer, cattle often consumed forage used by elk in the winter. However, elk tended to move into areas ungrazed by cattle that were steeper and more timbered. Food habits and range distribution of cattle and deer was quite dissimilar. Only in late summer, when cattle consumed more shrubs, was there much competition. Elk were considered more competitive to deer.

In Nevada, Lesperance, et al. (1970), found that competition for grass between cattle and deer occurred in spring, and for browse in late summer and fall. The authors recommended that cattle turnout be delayed

until May to allow sufficient recovery of the grasses. In late summer and fall it was suggested that cattle be grazed under a rotation system whereby any one range was not grazed every year. Therefore, the important shrub species would not be overgrazed and periodic cattle grazing would, in fact, improve the availability of shrubs to deer and maintain a succession stage favorable to deer. The authors stated that maximum deer production could only be maintained by livestock grazing manipulation of the plant community to provide favorable successional stages.

Several studies in Colorado have examined the extent of dietary overlap among various herbivores. Hansen and Reid (1975) reported that on summer range, cattle and deer diets were from 12 to 38 percent similar while cattle and elk diets were from 30 to 51 percent similar. Hubbard and Hansen (1976) found that cattle and deer diets were always less than 11 percent similar, and Hansen, et al. (1977) reported a diet similarity between cattle and deer of 4 percent. Olsen and Hansen (1977) studied cattle, deer, sheep and elk diets in Wyoming and stated that cattle and elk diets were 55 percent similar, while sheep and elk diets had a similarity value of 30 percent. Hansen and Clark (1977) found cattle and elk to be 46 percent similar in food habits and cattle and deer only 4 percent. The authors also stated that the effects of spring elk grazing on forage available to cattle in summer was greater than the effects of cattle grazing on forage available to elk.

Mackie (1970) stated that cattle could make sufficient use of deer forage plants and feeding areas to compete seriously where cattle stocking rates were high, when plant growth was reduced by drought or prior heavy use, or when grazing began too early, extended too long or occurred on critical winter or other seasonal range areas. The author

concluded by saying that interspecies competition, its nature and importance, is not well known nor fully documented.

The effects of cattle stocking rate and grazing systems have been studied by Skovlin, et al. (1968). Elk use decreased as cattle stocking increased. Little effect on deer was noted. Continuous or deferred rotation had little influence on elk distribution. However, at the heavy stocking rate, elk preferred rotation pastures, when cattle were not on them. The authors found little direct competition for forage on summer range. Big game used 25 percent of the total forage consumed but cattle consumed ten times more of the principal plants than did big game.

Ward, et al. (1973) observed that cattle and elk were socially compatible in southeastern Wyoming. Grazing patterns and preference for grazing areas was similar on summer range. Cattle stocking was moderate and the range was in good condition.

The effects of logging on big game have been researched. Clary and Larson (1971) found that elk consistently preferred areas within ponderosa pine forests where herbage yields were substantial and timber basal areas were low. Deer use appeared to be random. Seeding logged areas to palatable forage was suggested. Cover requirements were not mentioned.

In spring, deer and elk preferred to graze in grasslands and open forests where succulent forbs were present according to Edgerton and Smith (1971). Later in the season as forbs matured, a shift to heavier forested feeding sites occurred. The dense forest provided foods of a higher quality in late summer and fall as well as escape from summer heat. Seasonal food habits were summarized as grasses preferred in

winter, spring, and fall (regrowth); forbs in the summer; shrubs in the late summer and fall. Competition with domestic animals occurred in the late summer and fall when diets contained shrubs and the evergreen elk sedge; and use by all herbivores was in the forest. Recommendations for logging old growth were to disperse cutting in specific areas to allow for cover availability. Cutting small patches of old growth was recommended to increase forage production.

Clary (1972) provided management guidelines for Arizona ponderosa pine habitats. Openings (through logging) should be provided to increase forage production. Other areas should be logged down to 50 to 80 square feet of basal area per acre for some cover and forage production; while some areas should be maintained as thickets to provide bedding cover.

Edgerton (1972) stated that logging dramatically changes big game summer ranges, particularly for elk. Deer and elk use of clearcuts is extensive due to the availability of forage. However, adjacent sites that are unlogged and provide thermal and hiding cover are needed. Timber harvest activities should be planned so that adequate forage/cover ratios are maintained. Edgerton also raised the question of human harassment due to the increasing network of timber harvest access roads.

Deer were attracted to logged areas according to Wallmo, et al. (1972). Small block clear cutting should be practiced for best deer management. In Arizona, Patton (1974) reported similar results. Ponderosa pine cuttings should not exceed 45 acres. However, size was not as critical as depth. A maximum of 1,600 feet across a particular cut was recommended.

Lyon (1975) listed the following logging recommendations with considerations for wildlife:

- 1) In the timber harvest plan, leave security areas (uncut) for elk near the logging operation and roads.
- 2) Identify and maintain key components of elk habitat.
- 3) After logging, close roads.
- 4) Secure road crossing areas for elk (cover adjacent to road).
- 5) Keep elk management in mind when planning road construction or closure.

Ward (1976) reported that elk stay at least one-half mile from logging activity. Logging operations also decrease elk use in that area during the time of harvest. In his study, elk disturbed on their summer range by a logging operation, first went to a high timberline location until summer recreation traffic and sheep grazing forced another move. This time the elk went to their winter range and stayed there even though it was July. Ward further reported that this specific logging operation, because of its intensity, reduced effective elk habitat by 25 square miles.

Ward (1973) also reported that the spatial requirements for elk and recreationist was one-half mile. Elk maintained at least one-half mile space between themselves and campgrounds and other recreational areas.

Thomas et al. (1976) stated that elk are vulnerable to habitat change. Forage/cover ratios must be maintained. Cover on the winter range is most critical and small modifications here can have great impacts.

Verme (1969) reported that when deer were on a higher plane of nutrition, the number of fawns per doe increased. Robbinette et al. (1955) had previously found that nutrition played an important role in population fecundity. Condition (forage available) of the summer range was more important to sexually mature does than was condition of the winter range. Likewise, Julander et al. (1961) observed that in deer that shared equal condition winter ranges, summer range condition greatly influenced herd health. Deer on the good condition summer range were 10 to 35 percent heavier when mature and produced 36 percent more fetuses than did deer on the poor condition range. Twinning also increased on the good condition range.

To minimize mortality of deer on winter range, Robbinette et al. (1952) suggested that 50 percent of the available browse be utilized in moderate winters. Higher sustained yields (deer numbers) would result. Deep snows, in severe winters, cut down on deer mobility in searching for food as well as reducing forage available. Wallmo and Gill (1971) reported that snow depth has a tremendous impact on deer. Heavy snow winters reduce the winter range carrying capacity and usually deer declines occur. Conversely, light snow winters allow for more survival and the populations usually show some increase.

Buchner and Swanson (1955) reported that when elk densities were low in southeastern Washington, elk natality increased. The authors also stated that availability (pounds of forage per acre) was more important in winter elk survival than range condition. Ward (1973) reported that in spring, elk movements were keyed by the presence of new green forage.

Research on winter range improvements has been conducted. Anderson and Scherzinger (1975) have reported on a successful elk winter range improvement program. Planned grazing by cattle helped improve the quality of forage for elk in winter. Forage conditions helped draw elk to the managed areas. The authors did caution that the range could become overstocked and no reduction in cattle grazing could provide sufficient forage for elk and reductions could be necessary. Elk had maximum population potentials.

Parrish (1974) described a system of prescribed burning that was effective in improving forage available on an Idaho browse winter range. Plummer et al. (1968) also used fire to improve aspen type winter range.

Nagy and Wallmo (1971) found that deer browse in winter was nutrient deficient. Although protein content was adequate, the fiber content was too high and therefore, the available energy content too low for deer. They recommended that deer winter ranges have a strong herbaceous (grass) component to provide sufficient digestible energy.

Dassman (1949) reported that the Interstate (California-Oregon) Deer Herd winter range was managed so that livestock and deer each got 50 percent of the available forage. Adjustments in stocking, based on range condition, were made every three years.

Tueller (1976) summarized methods of deer range improvements. Included were range seeding, water development, grazing management systems, tree and brush removal, and miscellaneous land treatments.

Nelson and Burnell (1975) discussed cattle-elk competition for forage and space. The authors noted that elk avoided cattle and tended to graze areas ungrazed by cattle even after the cattle were removed.

Diets were also quite similar on this summer range. The authors presented an analytical model developed to quantify and evaluate competition. The model involved diet similarity, initial forage availability, utilization, vertical availability (shrubs), distribution patterns and forage consumption equivalents.

Management Documents

A sampling of USFS Land Management Plans was reviewed to obtain an indication of the present approach to forage allocation. The Biological Unit Management Plan for the Bridge Creek Management Area and Wildlife Habitats in Managed Forests were also reviewed.

On the Heppner Planning Unit there are one-fourth as many livestock AUM's present today as there were prior to 1920. Elk numbers were near the carrying capacity in the winter range in 1975, so elk numbers for that year (1975) are used in the allocation of forage for elk. Forage will be allocated to elk first. According to the management alternative selected, on given areas the remaining forage available to reach proper use will be allocated to livestock.

The Burnt Powder Management Plan gives a general overview of deer and elk populations and a description of seasonal ranges present on USFS land. Most of the winter range in the area is on private or BLM land; less than 10 percent exists on USFS land. The Plan states that in the Keating Big Game Unit there are 29 deer per mile. Twenty deer per mile is considered optimum by the ODFW. Deer die-offs commonly occur on the Keating Unit. Grass is a primary deer winter food constituent and the lack of fall rains and subsequent "green-up" increases the mortality. No conflicts between livestock and big game were evident except on winter ranges where the amount of forage left after

livestock grazing is directly related to the use of big game on adjacent private agricultural lands. Big game have preference for forage on USFS winter ranges.

Within the Grande Ronde Planning Unit, 20 percent of the total winter range exists on USFS land. Forage was considered the most sensitive element of the environment on winter range, unless cover was disrupted. The Plan also states: "It has been general practice to maintain habitat for wildlife in all areas as much as possible while maintaining essential product output (timber) levels."

The Desolation Planning Unit provides a calculation of forage allocation for livestock and elk. Various land types, proper use factors for each type, increases or decreases in herbage productivity due to logging, poor distribution etc., and an allowance for big game went into the determination of livestock stocking rates. Summer range use by elk is set at 6,000 and a carry-over of 5,100 which is the carrying capacity of the winter range. Since the winter range limits the number of elk present on summer range, cattle grazing is based on the forage available remaining after use by 6000 elk.

Generally, the Management Plans present a number of management alternative for the planning unit. Within each alternative are listed the changes that would occur in various aspects of the ecosystems; i.e., elk numbers, water quality, cover, forage production, livestock numbers.

A "preferred alternative" is included which is the one considered for implementation by the USFS. All plans reviewed stated that management of big game relative to actual population levels would be based on the carrying capacity of the winter range.

The Bridge Creek Biological Unit Management Plan was put together jointly by the USFS and ODFW. It entails management alternatives for a specific block of land where a single resource (elk winter range) is the primary management goal. The agreed upon alternative is described and the consequences on various components of the ecosystem are listed. A plan for timber, livestock and elk management, methods for determining elk numbers, and methods for vegetation trend monitoring are detailed.

Wildlife Habitats in Managed Forests - the Blue Mountains of Oregon and Washington (1979, Thomas, J. W. Ed.) has been developed as a guide to management. Requirements of various classes of animals for food and cover are listed and the consequence of certain management decisions are also given as guides in determining various methods of timber harvest and predicting the outcome on various animal populations. The work represents "state of the art" knowledge of the organisms listed. For deer and elk, optimum forage/cover ratios are given. It is also stated that on summer range, if livestock grazing limits the forage for deer and elk, then big game species should be given full consideration. If summer ranges contain optimum numbers, then the winter range carrying capacity could be exceeded. Identification of winter range carrying capacities should be identified and populations managed accordingly.

Popular Press

Included in this section are summaries of articles that appeared in local (northeastern Oregon) newspapers.

An article in the Wallowa County Chieftain dated October 20, 1977,

stated that the Big Game Committee of the Wallowa County Legislative Committee was considering fee hunting on private lands as a possible reimbursement for damages to crops and range incurred by big game. The Committee also looked into the possibility of suing the State for damages. The Committee also heard a suggestion to conduct its own game counts as several members disagreed with ODFW counts.

The Wallowa County Chieftain in an editorial comment, also dated October 20, 1977, stated that ranchers were due some compensation for losses incurred by wildlife grazing. Posting private lands as a sign of dissatisfaction with the ODFW was not productive. Periodic dissatisfaction with game numbers by ranchers has occurred since the 1940's. The article did state that crops and range damage were real on range and cropland where big game tend to congregate.

Riley Woodford reported in the Wallowa County Chieftain (November 4, 1977) on a tour of ODFW personnel and members of the Oregon Fish and Wildlife Commission. The Wallowa County tour included observation of range and crop damage throughout the county. Damage estimates were 247,000 dollars on 230,000 acres of private land. A map of areas of concern and high elk populations where severe damage was occurring was presented by the rancher's group. Another article on November 10, 1977 also recapped the tour and detailed crop, fence and range damage observed on the tour. An editorial on the same day expressed sympathy with the ranchers and suggested that steps be taken to alleviate game damage to cropland and private rangeland.

Areas in Wallowa County where hunter numbers were limited in 1977 were reported to have lower hunter numbers and rather low success ratios. The Wallowa County Chieftain (November 18, 1977) also reported in the

same article that the Minam Unit where hunter access was not limited received heavier use. The Minam Unit is primarily public land whereas the aforementioned units contain much private land.

Riley Woodford in the La Grande Observer (May 1, 1978) reported on a joint meeting of the Oregon Fish and Wildlife Commission and the Rancher-Sportsman Committee of the Oregon Cattlemen's Association. Members of the OCA presented damage claim results requested by the commission. The OCA contingent stated that game numbers were in excess of carrying capacities in many areas and increased permits (for special hunts) were required to bring game levels back down to habitat capacities. It was pointed out that in 1977 the Commission set permit numbers which were then cut 50 percent by the Legislature.

The Wallowa County Chieftain (June 1, 1978) reported on an Oregon Fish and Wildlife Commission meeting held in Enterprise. Ranchers present pointed out that in Wallowa County elk numbers were increasing in all areas. Limited entry hunting was an unworkable method because local hunters and even land owners faced a random draw and may not be able to hunt near their homes or on their own land. Also, in 1977 during the drought, when cattle numbers in eastern Oregon were cut by 33 percent to prevent range damage, due to the lack of forage, big game hunting was not increased to prevent similar damage by big game.

The La Grande Observer (November 27, 1978) reported on the Oregon Cattlemen's Association Annual Meeting. The OCA recommended that herd levels be reduced to carrying capacity levels; a new method of game inventory be used as current methods were inadequate; uniform techniques to determine the extent of range use by cattle, deer and elk be used

by all state and federal agencies and land owners on public and private land; and an emergency hunt roster be maintained for use as needed on damage areas.

The La Grande Observer (December 1, 1978) reported that an emergency hunt would be held in Grant County where deer had moved into alfalfa fields and were causing damage. Fifty hunters would be allowed to take two deer.

Dick Cockle, in the La Grande Observer (December 1, 1978) suggested that the acquisition of "marginal" lands for winter range by the ODFW was a partial solution to the overuse of private lands by big game. The article which summarized an interview with Charles Cater, a La Grande attorney, also stated the ODFW procedures for estimating big game numbers was inadequate.

The Forest Patrol Dispatch, a publication put out by the Oregon Forest Protection Association stated in its January 16, 1979 release that foresters and cattlemen were alarmed with wildlife management policies in eastern Oregon. Foresters were concerned that timber harvest on public lands was being modified and restricted for the purpose of increasing elk numbers. Also, the ODFW was attempting to build elk numbers through the use of private lands.

The La Grande Observer reported on a recent Fish and Wildlife Commission public meeting held in Baker. Again, ranchers presented their case; that too many elk exist in eastern Oregon and that private rangelands are being overgrazed. Methods for making population estimates were also criticized.

ONGOING RESEARCH

Range and Wildlife Habitat Laboratory, PNWFRES, USFS

Dealy has studied the effect of thermal cover and climactic condition on deer behavior on a sagebrush dominated deer winter range. Edgerton has examined the suitability (seeding success and production) of various shrubs for deer and cattle forage and deer cover on a sagebrush dominated deer winter range.

Skovlin, McConnell and Edgerton have studied fertilization, burning and cattle grazing effects on winter range use by elk. Fertilization increased elk use by 49 percent. However cost effectiveness was questioned. Burning did not increase elk use. Spring cattle grazing at a heavy intensity reduced elk use 11 percent in one of the three years studied. The scientists speculated that light intensity spring or summer cattle grazing might have little influence on elk use if winter elk forage supplies and range conditions were acceptable.

Skovlin and Vavra estimated the diets of deer and elk and calculated dietary overlaps for these two species grazing common use winter-ranges in the Blue Mountains. Perennial grasses preferred by cattle on spring-summer-fall ranges were also preferred by deer and elk grazing these same ranges in the winter. Consumption of grasses by deer and elk increased in late winter when increasing temperatures initiated new growth of the grasses.

A cooperative study by the PNWFRES, ODFW and OSU has examined the influence of various cattle grazing systems on riparian vegetation. Concomittant with this, cattle production on deferred rotation, rest rotation and season long grazing systems has been observed. The in-

fluence of these systems on big game distribution and grazing is not included.

Eastern Oregon Agricultural Research Center, Oregon State University

Vavra has studied the diets of cattle on forested foothill rangeland in summer. Vavra, Holechek and Skovlin determined the diets of cattle grazing various plant communities and grazing systems in the Blue Mountains. In both studies grasses were found to dominate diets until late summer when shrubs became important as the grasses matured and dried. If fall rains occurred, the subsequent forage (grass) regrowth was preferred by cattle.

Vavra and Edgerton have observed the winter diets of deer and the spring and fall diets of cattle on a deer winter range. Diet overlaps and estimated stocking rates were synthesized. Sagebrush was the most common species consumed by deer. Thurber's needlegrass and Sandberg's bluegrass were important grasses consumed. Forbs were not important diet constituents. Cattle in the same area primarily consumed cheatgrass and crested wheatgrass in late spring. Forbs and shrubs were not important in the diets.

Oregon Department of Fish and Wildlife

Pederson has observed radio-collared elk on various plant communities previous to, during and after logging. Logging activity was found to impact elk distribution. Leckenby has also observed radio-collared elk in the Blue Mountains. Elk have been followed through the entire year to observe migration activity and plant community use. Very little interaction was noted between elk and cattle on summer range. Elk and domestic sheep use the same feeding areas but at different times, sometimes within the same day. Elk from several winter

ranges often converge on the same summer range.

Rangeland Resources Program, Oregon State University

Krueger has just initiated a study on the Oregon Range Validation Project that will determine the effect of various land management strategies on deer and elk winter habits and the interrelationship that occurs with livestock.

INTEGRATION

Interview results indicate that the primary area of concern is winter and early spring grazing by deer and elk. Most of the winter range areas of eastern Oregon exist on private lands. Forest Service Management Plans also point this out. Scientific literature is available documenting the importance of available forage (lb/acre) for survival of deer and elk. Trampling damage is mentioned as an important unknown factor, i.e., does it in fact impact soils and vegetation on a long term basis? Development of methodology to improve distribution on winter ranges to decrease the impact on specific areas is needed. The physiological effects on forage plants of early spring grazing on new growth should be considered. Ongoing research is directed toward winter range studies (Dealy; Edgerton; Skovlin, McConnell and Edgerton; Skovlin and Vavra; Vavra and Edgerton; and Krueger). However, these studies attack specific points and an attempt to integrate all facets of winter range grazing and impacts has not been accomplished.

The importance of animal condition coming off the summer range and its influence on winter survival has been reported in the literature. The concern of many interviewees that grazing systems, logging (through distribution changes) and the resulting competition for forage may decrease body condition of deer and elk going onto the winter range

indicates a need for summer range research. Leckenby has stated that elk from several winter ranges may converge on one summer range. Currently Forest Service Management Plans, for various planning units, call for maintaining forage on the summer range for the number of animals meeting the carrying capacity of the adjacent winter range. Large errors in forage allocation could be made if the seasonal movement patterns noted by Leckenby were not considered and known for each planning unit.

Even though considerable information on food habits exists in the literature, it appears that Forest Service Management Plans, as a whole, do not consider the dietary habits of each herbivore when allocating forage. The Desolation Plan allowed a .1 AUM overlap between cattle and elk. The literature does point out, however, that food habits are quite variable, depending on availability. Therefore food habits research aimed at an applied basis should be continued. Interviewees also listed this as a need.

The literature available and ongoing research point out that few studies of a holistic nature are conducted. Most studies attack a specific problem in a given area, i.e., food habits, cover, logging impacts. Large studies are needed that cover the entire range of seasonal distribution patterns, interactions among all grazing herbivores, impacts from exterior influences (logging), vegetation availability and impacts, and soil relationships to name a few.

PROBLEM RESUME

Biotic

Animal

Numbers of deer, elk and livestock appear to be the immediate prob-

lem based on interviews. To affected ranchers, there are too many deer and elk grazing private lands in the winter and spring; in some cases year round. Cattle numbers have to be decreased due to less forage availability, according to ranchers. The ODFW is concerned first with deer and elk numbers to provide animals for hunting and watching, consistent with habitat management. Cattle grazing on important winter ranges should be decreased to provide more available forage for deer and elk. The USFS and BLM are concerned with the numbers of livestock, deer and elk grazing administered lands as they must attempt to meet the requirements of multiple use and sustain resources in a predetermined condition. Certainly, a given tract of land has a carrying capacity which cannot be surpassed. However, the complaint of too many animals may be the result of improper management or the lack of any management.

Distribution of animals, especially on winter range, is definitely a problem. Both deer and elk congregate in rather large herds in winter. If these large herds are found on one rancher's property then he feels there are too many deer or elk. Distribution of those animals into smaller groups and over larger areas should decrease this complaint. Distribution of cattle on range continues to be a problem. Cross-fencing, salting and water development are effective in many instances; but distribution within pastures can still be poor. Planned distribution of deer and elk is an area of needed research. There are several abiotic factors that influence distribution and these will be discussed in that section.

An important aspect of deer and elk is their eating strategy from a metabolic standpoint; application is particularly acute on winter

range. Deer, because of their smaller size have a reduced rumen to body size ratio when compared to elk. Therefore, deer must consume forage that is higher in quality than elk. Elk, on the other hand, have a higher absolute maintenance requirement so they must consume a greater quantity of forage than deer. Management of winter ranges then should be for maximizing forage quality of a deer winter range and for maximizing forage quantity on an elk winter range. It must be kept in mind that acceptable minimums of these parameters must be met. Elk preferred a higher quality forage that existed in less quantity over a forage that was more available but of less quality as reported by Anderson and Scherzinger (1975).

Food habits of the various grazing animals are important considerations of management for forage allocation. Larger populations of herbivores can be maintained where food habits of each are diverse and complimentary (Bell 1971). Even where food habits between two herbivores are similar, management strategies are possible where one can compliment the other (Anderson and Scherzinger 1975). Food habits of herbivores is based on eating strategies, stage of production, preference and forage availability.

Plant

Forage productivity on big game winter ranges is probably the most important plant aspect to consider. The typical eastern Oregon winter range is foothill land that exists between higher elevation forested land and lower agricultural land or river bottom. These ranges in many cases are dominated by increasers or invaders as a result of past livestock grazing practices. Bunchgrasses dominate the better condition

ranges. Winter ranges are normally grazed in the spring and/or fall by livestock. Spring grazing can be beneficial to big game if grazing is managed so that the forage is allowed to regrow following livestock use. (Anderson and Scherzinger 1975). However, fall livestock grazing can be detrimental to forage available for big game. When fall rains occur, regrowth on grasses usually occurs depending on the amount and timing of the precipitation. Compared to the mature cured out forage remaining from the previous spring, regrowth is of superior nutrient quality and is readily consumed by all herbivores. Removal of regrowth and mature forage by livestock in the fall decreases the quality and quantity of forage available for wintering big game and can lead to decreased survival.

Different forage classes (grass, forb, shrub, conifer) provide nutrients at different levels (Diets and Nagy 1976). Forbs and grasses are energy sources while shrubs and conifers provide protein. Phosphorus is an important mineral that becomes deficient in mature grasses and forbs. The live tissue of shrubs and conifers does provide some phosphorus. Therefore, for optimum herbivore nutrition, the ideal winter range contains a diverse vegetative cover.

Abiotic

Physical

Herbivores are impacted by the physical environment and manipulations imposed thereon. Topography and slope aspect are key deer and elk distribution factors on winter range. Hillside slopes that are blown free of snow and south facing slopes that receive more direct sun and hence melt off quicker are favored by wintering game animals because of increased forage availability. However, areas that offer wind pro-

tection and cover are also needed for thermal conservation. Cattle tend to graze lower slopes and canyon bottoms, so in some cases forage competition is minimized. However, where large flats exist, that are cut periodically by drainages, cattle grazing readily occurs on the top (Bridge Creek Flats serves as an example).

Thermal regulation is important to game animals on both summer and winter ranges. Changes in cover availability created by management activities (logging or sagebrush spraying) can have drastic impacts on game distribution and result in increased interspecific and intraspecific competition.

On summer ranges, cattle use of heavily timbered areas and steep slopes is usually rather light. Cattle use may increase in heavy timber during late summer when forage in the more open areas has matured, while that under the tree canopy is still green.

Soils present on winter ranges play an important role in plant community development and therefore, forage available per acre. Soil abuse in the early spring, when soils are saturated with moisture, subject to periodic freezing and thawing and then trampled by elk, may be responsible for plant community changes.

In some areas of eastern Oregon, summer ranges are met at the lower elevations by agricultural land; foothills normally used as big game winter range do not exist (eastside Elkhorn Mountains).

Climatic

The influence of climate on forage production is most profound. Precipitation patterns in eastern Oregon are such that summers are characteristically dry, causing most forage species to go through a dormant period. Maturation of grasses must occur while sufficient soil

moisture remains. Fall rains are sporadic but very important for regrowth of grasses that provides high quality forage to wintering game animals. Most winter ranges are located in foothill areas where the annual amount of precipitation is also a limiting factor to forage production.

Severe winter weather increases the nutritional needs of big game animals in response to thermal maintenance requirements. The more severe the winter, the greater the need for high quality and highly available forage. Cover requirements would also be of greater importance in more severe winters.

Humanistic

Economic

A brief look at Table 4 reveals that ranchers in Wallowa, Umatilla, Baker and Union counties feel that they have incurred tremendous losses to their grazing lands due to deer and elk grazing. In the four county area 217,993 and 421,998 dollars for deer and elk damage to grazed lands respectively, were reported. Timber harvest and cattle production are both economically important industries to eastern Oregon. Both industries utilize resources on public lands. Ranchers vary from slight dependence on public lands to ranches whose entire source of summer forage is public land.

Spring and fall cattle ranges are important short term feed sources as they decrease the number of days cattle are required to be fed hay. These same ranges provide winter and spring forage important to deer and elk. Delays in range readiness due to deer and elk grazing of the initial growth on grasses in the spring (grazing deferment would be required for sufficient regrowth after big game grazing) would cause

cattlemen to keep their cattle on hay longer. In the eight county area of eastern Oregon, 76 percent of the forested land is considered commercial in nature.

Social

Ebert (1978) stated that in the northeastern region of Oregon, in 1977, there were 310,070 and 413,510 hunter days, respectively, expended in hunting deer and elk. The Forest Service (Statewide Comprehensive Plan for Fish and Wildlife, 1979) predicts that in 1980 deer and elk hunters on Forest Service land will expend 208,000 and 349,000 hunter days respectively. Hunting then, has to be considered an important recreational activity of the residents of Oregon. The amount of time spent viewing wildlife by hikers, campers and other recreationists is more difficult to document; however, it should be considered significant. The growing population of Oregon will surely place increasing demands on deer and elk herds and on the ODFW to supply huntable and observable populations.

Land

Ownership

Eastern Oregon big game winter ranges are dominated by private land ownership in many areas. Purchases by the ODFW of key tracts of winter ranges have been made in an attempt to alleviate the pressure placed on private lands. Transitory ranges (spring and fall) are comprised of a mosaic of public and private (single ownership and forest products companies) lands. Summer ranges are primarily Forest Service administered. However, resident populations of deer and elk inhabit lower elevational transitory ranges in summer as well.

Management

Land in private ownership is usually maintained to provide a single resource. Cattle and/or crop production optimization with occasional income from timber harvest occurs on many lands that are big game winter ranges.

Foothill ranges provide forage to cattle in the spring and fall and compliment the summer grazing allowed on public and forest products company lands. Management objectives on this type of rangeland are to provide sufficient deferment of the range in the spring so that forage growth has passed a stage critical to grazing damage and soils are sufficiently firm to prevent trampling damage. Grazing again takes place in the fall when the higher elevation ranges are closed to grazing. Ranchers like to graze cattle on the regrowth produced from fall rains as it is high in nutrient quality and allows for increased cattle weights going into winter as well as decreasing the time cattle must spend on harvested crops. Better cow condition going into the winter allows less feeding (fewer pounds per head per day) during part of the winter and decreases costs. Timber harvest on lands primarily managed for cattle production is accomplished to provide occasional income with additional benefits of regeneration and increased forage production. No thought is given to big game cover consideration in most cases.

Forest products companies manage their land for the optimization of wood production. Cattle grazing is allowed but only as it fits the timber management plan. Foresters voice concern over large numbers of big game (Forest Patrol Dispatch 1979) as management for big game can decrease timber harvest (mature trees left for cover).

Agencies charged with the management of public lands are required

by law to maintain multiple use objectives. Agencies are also faced with pressure from various sources to maximize several of these "multiples". By 1990 Forest Service plans for eastern Oregon include a 10 percent increase in the habitat carrying capacity for deer and elk (Statewide Comprehensive Plan for Fish and Wildlife on the National Forests in the State of Oregon 1979). A 20 percent increase in demand in livestock AUM's on forest-range by 1980 and 50 percent by the year 2000 (compared to 1965 levels) has been predicted (Forest Range Task Force 1972). Also predicted was a 40 percent increase in the United States' consumption of softwood. All forms of recreation are expected to increase up to 500 percent of 1965 levels by the year 2000. Future management objectives will be formulated around these demands.

Specific management objectives that are now in effect have direct impacts on forage allocation. Timber harvest methods, livestock grazing management, wildlife management and recreation management strategies must now be considered and integrated on public land.

RESEARCH APPROACH

Prioritization

Examining big game-livestock interactions over the year long grazing system is an ideal approach. When funds and personnel are limited, a prioritization of various aspects of the forage allocation problem is required.

Winter range appears to be the most critical area, both from a big game survival standpoint and lack of tolerance to big game from private landowners. Research ideas in order of priority applicable to winter range are:

Plant-Soil Investigations

- 1) Development of range improvements. Incorporate data from ongoing research (Edgerton; Dealy; Vavra and Edgerton) and develop new methods into practices as reseeding, prescribed burning, fertilization and livestock grazing management alone and in combination to improve forage production and provide suitable cover.
- 2) Analyze the effects of trampling on soil compaction and forage production.
- 3) Determine the effects of early spring grazing on plant physiology related to intensity (percent use) and duration of grazing. If early spring grazing causes physiological damage, then the use of rotated fall cattle grazing (to make an area more or less preferred to deer and elk in spring and hence allow a rest to a portion of the range) should be explored. Other methods to defer spring game use should be explored as well.
- 4) Improve and develop methodology for the estimation of carrying capacity based on forage available and nutrients available to big game on winter range so that herd decreases through hunting will be more effective.

Animal Investigations

- 1) Develop methods to better distribute and disperse big game on winter range over larger areas and prevent damaging impacts to relatively small sites.
- 2) Reevaluate present census methods and if necessary develop new methods to determine numbers.

- 3) Develop "management oriented" methodology by which forage allocation to livestock and big game can be estimated. Data generated should include food habits and distribution patterns.
- 4) Develop methods of appraising deer and elk condition going onto winter range and correlating that to forage available to determine carrying capacity.
- 5) Identify various factors that are limiting or attractive to elk and deer on winter range.
- 6) Investigate various elk feeding systems or develop alternatives and distribution techniques on areas where little winter range exists (eastside of the Elkhorn Mountains).

Summer range forage allocation research needs are:

- 1) Investigate the influence of livestock grazing systems, particularly rest rotation, on forage available and distribution of deer and elk.
- 2) Investigate various methods to better distribute cattle, deer and elk on summer range; and to better understand motivations for present distributions. Where elk have been displaced by past logging and the loss of cover methods to attract elk back to these areas should be investigated. Would the presence of high quality re-seeded forages (legumes) be sufficient to overcome the need for hiding cover and thermal neutrality?
- 3) Develop guidelines for managers to estimate stocking rates (allocate forage) for livestock and big game on

summer range. Considerations for dietary overlap and spatial overlap should be investigated.

- 4) Develop means by which non-migratory big game animals that spend summers on the forest fringe and travel daily to croplands for forage could be distributed or "forced" to migrate.

Proposed Studies

Funding unlimited

Research projects currently involved with forage allocations or related areas (distribution, habitat preference, food habits, cover requirements, range improvement) are not integrated; they exist as separate projects conducted by different research groups (ODFW, PNWFRES, OSU). In order to approach the problem of forage allocation and related subjects that influence the problem, an interdisciplinary approach that would study the entire wildlife-livestock-forage system would be ideal. Forage allocation for livestock and elk appears to be of primary concern, however in two areas (Keating and John Day) the deer-livestock problem is very important. Outlines of studies listed are not specific for all phases but are given as starting points to be used by scientists involved should projects be initiated. Most of the points listed in the prioritization section should be incorporated in this section.

Elk

A ten year study is outlined. The first five years would involve observation of elk-livestock-range-forest relationships as they currently exist. At the termination of this phase, decisions would be made to modify various parameters (to be determined from the first five years data and a prioritization by "need"). The next five years then would

be involved with: 1) Initiation of modifications (range improvement, logging, grazing management changes, etc.) and 2) Monitoring and interpreting results.

Research Outline

I. Study Area

The basis of study area selection should be elk winter range areas. Three locations to serve as blocks would be ideal. Two high priority locations would be Bridge Creek Management Area and the Snake River Divide because of existing data. Other possibilities include:

- 1) Chesnimnus Big Game Unit, due to the controversy in this area;
- 2) Strawberry Mountains or adjacent area because elk numbers are increasing here and elk impacts are unknown; 3) an area that would include the Starkey Experimental Forest because initiation of modifications would be accomplished here easiest and because of the data that exists relative to plant communities, forage production and grazing management.

At least one study area should be based on an elk winter range that is primarily private land.

II. Objectives (First five years)

- 1) To establish the year round patterns of movement and home ranges of elk.
- 2) To establish cattle movements on spring, summer and fall ranges.
- 3) To identify habitat preference of each herbivore.
- 4) To measure forage production and seasonal availability.
- 5) To determine seasonal food habits of elk and cattle and establish dietary overlaps.

- 6) To integrate dietary overlaps, forage consumed, forage available and distribution overlaps.
- 7) To model forage allocation based on objective 6.
- 8) To develop management methodology for allocating forage.

Procedures - First two years

- 1) Establish the boundaries of the three study areas. Elk winter ranges would serve as starting points. Elk movements would then be monitored for two years over their entire seasonal ranges to establish the study areas.
- 2) Map plant communities/habitat types on the study areas.
- 3) Establish procedure for sampling forage production/availability.
- 4) Identify cattle grazing allotments and logging operations, past history and current plans.

Procedures - Years 3, 4, 5.

- 1) Monitor year round elk movements (including habitat type on each seasonal range).
- 2) Monitor cattle grazing (including habitat type on each seasonal range).
- 3) Measure seasonal forage production and availability.
- 4) Determine food habits of cattle and elk.
- 5) Attempt to identify limiting factors to elk and livestock use.
- 6) Development of overlaps, models and management methodology.

Initiation of the second five years study would be based on data generated. Manipulations of animal numbers, range improvements, changing

patterns of grazing and timber harvest are some examples of variables that could be applied to the study area. Once a set of manipulations was accomplished then procedures of study would be similar to those given for years 3, 4, and 5.

Deer

The approach on deer would be the same as elk. Study areas might include the Keating deer winter range, Murderer's Creek Management Area and deer winter range that exists on private lands in Grant County.

Funding Limited

Research ideas presented in the Prioritization section would be handled separately under limited funding. Priorities would change dependent on the availability of funds. Development of range improvements (Item 1, Plant-Soil Investigations, winter range) would be rather costly, while analyzing the effects of trampling (item 2, same section) would require less funding and therefore shift to a higher priority.

Also, the intensity or direction of study of each item would vary with funding. Item 4 under Plant-Soil Investigations, winter range could be limited to measurements of pounds of forage available per acre and estimates of crude protein and in vitro digestibility for the calculation of carrying capacity under severely restricted funding. However, a more accurate data base would be established if item 4, Animal Investigations winter range was incorporated into the study.

Since "funding limited" is a rather vague term and there are certainly degrees of "limited" it is hard to effectively reprioritize the Proposed Studies. Level of funding and intensity of study each would influence if and how well each item could be addressed. However, any investigations should be based on needs for the data generated as the

first priority.

COMMENT

In reading the report it becomes obvious that many of the problems are not biological in nature and cannot be studied or solved by research. Ranchers and the Oregon Department of Fish and Wildlife are the two major antagonists. Both are "single resource" oriented groups. Recognition by the ODFW that large numbers of big game graze private land winter and spring and that continued use of such must be accomplished through cooperative efforts of range planning and improvements, and even cost sharing is necessary. Also rancher recognition that Public Lands are managed for multiple use and concessions for grazing certain areas that are key wildlife ranges must be made.

Public Land Agencies are faced with the difficult task of maintaining multiple use concepts on administered lands. Livestock numbers can be controlled through cuts in allotments, and decreases in big game numbers can be suggested. However both issues can become difficult to accomplish. Unfortunately, decreasing numbers is used at times because it is the easiest approach. Corrective management and thorough inventories to better describe the problem are more time and dollar consuming.

Little can be done until the involved parties recognize each others goals and problems. Cooperative programs can be established on private and public lands but it takes patience, acceptance and willingness to compromise.

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A P P E N D I X

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APPENDIX A

PERSONNEL INTERVIEWED

Ranchers

Wallowa County - Jack McLaren, Mack Birkmaier, Wayne McPhetridge

Umatilla County - Louis Umbarger, Lou Levi, Terry Anderson, Jim
Whittaker, Bob Lazinka

Grant County - Tom Swaggert, King Williams, Bob Sproul

Baker County - Fred Phillips, Tim Berns

Union County - Heber Glenn, Wilbur Smith

Extension Agents

Wallowa County - Dave Dickens

Umatilla County - Fred Kerr

Grant County - Fred Otley

Baker County - Peter "Gus" Markgraf

Union County - Ralph Hart

Oregon Department of Fish and Wildlife
Big Game Biologists

Wallowa County - Vic Coggins

Umatilla County - Don Wilt

Grant County - Ralph Denney

Baker County - Richard Humphreys

Union County - Mike Kemp

Staff Biologists

Paul Ebert, Del Sanford, Portland

Regional Habitat Biologists

Jack Melland, La Grande

Forest Service

Wallowa-Whitman

Rod Miller, Wildlife Biologist
Bob Bamberg, Range Conservationist

Umatilla

Roger Baker, Wildlife Biologist
Walt Johnson, Range Conservationist

Malheur

Warren Current, Wildlife Biologist

Region - 6 Staff

Rod Canutt, Wildlife Biologist
Clarence Allman, Range Conservation

Others

Loren Hughes, Isaac Walton League
Matt Kniesel, Wildlife Biologist, BLM, Baker
Charles Oakley, Game Warden, Wyoming
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Additional information supplied by:

Paul Edgerton, PNW Forest and Range Experiment Station, La Grande, OR

Richard Pederson, Research Biologist, Oregon Department of Fish
and Wildlife, La Grande, OR

Donavan Leckenby, Research Biologist, Oregon Department of Fish
and Wildlife, La Grande, OR

William C. Krueger, Leader, Rangeland Resources Program, Oregon State
University, Corvallis, OR

APPENDIX B

INTERVIEWS

RanchersWallowa County

Jack McLaren ranches in the Imnaha Canyon area of Wallowa County. His operation includes private and public land. His comments cover the Imnaha and Snake River Big Game Management Units.

Elk were considered the more serious competitor to livestock. Deer were a problem in some areas on cropland and during some years when the populations peaked. However, deer were not considered a serious problem in an overview of the competition problem.

Competition for forage occurs both summer and winter. Elk use the lower elevations of the canyons for winter and early spring range. They move to the lowest elevations as the forage greens-up in the spring. The lower elevations, particularly the more level benches, are used for winter and spring range for cattle. There is a strict system of cattle grazing deferrment on these ranges as they are critical to cattle production and are limited in size, particularly in the Imnaha Unit. Elk numbers are now large enough to threaten the forage resource.

The lower elevations of the Imnaha Unit are mainly in steep breaks; benches are limited so the forage available to cattle is limited. Winter use by elk is very critical in this unit.

Complicating the problem is the recent tendency of large numbers of elk to remain on the lower elevations year round and not migrate to the higher elevations. In the Snake River Unit where the non-migration problem is particularly acute, fire control and the lack of logging may be the cause. Dense overstories of lodgepole pine suppress understory forage production thereby limiting the amount of forage available. The

elk would rather stay on the lower elevations where more forage is available, or move back low after a brief stay at higher elevations. On some ranges the forage is 50 percent utilized when the cattle go on range the first of August.

McLaren further stated that in the Snake River Unit ranchers would like to see about 2000 elk; the same number that the Snake River Area Resource Management Team is proposing. However, by his interpretation of Oregon Department of Fish and Wildlife figures, there are now 3,000 elk present. Under present hunting regulations, he wonders if control of the population is possible.

Research ideas expressed included methods for improving elk distribution. About 50 percent of the canyon country used for cattle winter and spring range is not used by cattle. If the elk could be distributed into these areas the competition problem would be less severe. Also, annual and seasonal patterns of elk use are quite variable, therefore distribution methods would be implemented to varying degrees and in different ways dependent on the specific cases. He suggested a comparison of cattle production (weight gains) on ranges grazed solely by cattle and those grazed jointly with elk to ascertain impacts of elk removal of forage.

McLaren felt that Forest Service personnel were not anxious to address the elk problem in terms of range abuse and were generally ignoring the issue.

Mack Birkmaier is a rancher in the Chesnimus Game Management Unit of Wallowa County. He ranches on both private and public land. In the past, summer range competition has not been a problem but elk herds have increased considerably in the past few years. Data provided by Birkmaier

and available from the Oregon Department of Fish and Wildlife illustrate the increase (Table 1). Part of the problem is that the Management Objectives listed in Table 4 are not being followed. In fact the average is about 23% over.

Most winter range is on private land and the problem there has been critical but increased forage utilization by elk on summer ranges has led to over-utilization in some areas. On the Peavine Creek deferred range (USFS), browse use in the riparian zone is so extensive, prior to cattle turn-out, that if it were done by cattle, Birkmaier is sure that the cattle would have been removed. Also, rest rotation grazing appears to intensify elk use on rested or deferred pastures so that, in fact, no rest occurs.

When Birkmaier first ranched this country there was little range management, few water developments and little fencing. Now with much more intensive range management and the same number of cattle, the range appears to be deteriorating. On pastures grazed in rotation systems, most of the available forage plants are grazed leaving no mature growth present at the end of the grazing season. The following spring, during the rest period, the absence of this old growth makes the new spring growth more available and hence grazing on these rested areas commences in the spring because of increased palatability.

Birkmaier listed five desires of ranchers in big game management:

- 1) Bring herd levels to the management objectives during the next hunting season.
- 2) Refine counting and censusing methods.
- 3) More landowner relief should occur through special hunts and kill permits, if necessary.

Table 1. Rocky Mountain Elk population trends 1969 to 1978

Unit	Wildlife Management		Management Objective	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969
	District	Union											
Catherine Cr	Union	4.0		4.9	5.3	3.1	4.3	4.5	4.4	3.8	2.5	3.0	3.1
Chesnimnus	Wallowa	10.5		13.3	9.6	11.3	9.4	10.8	9.1	9.7	7.7	7.2	6.6
Desolation	Grant	6.0		7.6	7.1	6.4	8.7	5.0	6.9	4.1	7.7	4.8	5.1
Heppler	Heppler	10.0		12.3	19.5	12.7	11.9	8.4	6.8	12.6	6.7	5.1	8.0
Imnaha	Wallowa	3.0*		3.4	3.2	2.7	3.3	2.8	3.0	2.1	2.6	1.5	3.2
Keating	Baker	1.5		3.2	2.0	1.1	1.8	1.7	0.9	1.0	1.0	1.7	0.4
Minam	Wallowa	8.5		10.5	8.4	8.6	8.3	8.0	4.6	6.3	6.4	6.2	8.2
Mt. Emily	Umatilla	25.0		28.6	25.2	33.6							
Murderer's Cr	Grant	2.5		2.3	0.8	0.4	2.2	1.8	0.9	0.8	1.5	1.3	0.6
Northside	Grant	2.5		1.7	1.2	1.5	1.2	1.5	0.8	1.0	0.6	0.5	0.4
Pine Creek	Baker	2.2		2.5	2.2	2.3	2.6	3.8	1.5				
Sled Springs	Wallowa	13.0*		17.0	11.7	15.0	12.6	12.6	10.3	11.6	10.8	12.6	10.3
Snake River	Wallowa	10.5*		13.9	8.2	8.9	9.2	9.6	7.2	7.1	6.8	7.4	6.3
Starkey	Union	16.0		29.5	26.7	19.5	16.4	19.9	22.5	12.0	14.9	10.0	8.3
Sumpter	Baker	3.0		3.9	2.3	3.2							
Ukiah	Umatilla	40.0		36.7	46.2	48.5	45.8	44.2	28.8	34.4	22.9	21.1	20.8
Walla Walla	Umatilla	20.0											
Wenaha	Wallowa	18.5*		19.7		17.0	18.2	19.5	15.5	14.5		16.0	13.2
Baker	Baker				2.3	3.2	2.2	4.2	2.7	1.4	2.5	1.5	1.4
Umatilla	Umatilla				25.2	33.6	26.4	24.7	20.3	22.1	17.9	17.9	26.9

*Obtained on March 2, 1979 by phone from Dan Eastman.

- 4) Forage utilization measurements should be taken seasonally on key ranges to differentiate cattle and elk use.
- 5) Herd management objectives, census figures, harvest and mortality figures should be published in the Oregon Wildlife magazine.

Additionally, the ODFW should explore the use of salt in winter distribution. There should also be a cost sharing program whereby the ODFW would bear some of the costs of water development, salt use and range improvement where big game benefit and are consumers.

Birkmaier concluded his comments by voicing his concern for the forest range resource; maintaining stable cattle numbers and increasing range improvement where possible. He also felt that the Forest Service had been avoiding the issue. Further, the staff wildlife biologist on the Wallowa-Whitman has never met with Wallowa County ranchers to address the problems discussed.

Wayne McPhetridge owns rangeland on the east side of the Imnaha Canyon. He winters about 400 elk on his land. Additionally, about 200 elk remain on the property the rest of the year. Elk numbers have gotten to the point of damage during the last three years. The most intense damage occurs early in the spring on new growth. In fact, one area of the private land was not grazed by cattle in 1979 because of early elk use. Cattle will effectively move elk off a range but the elk use is so early ranchers dare not turn out cattle. Fence damage by elk is also an increasingly costly problem. Hunter use on this area is very light because of the roughness of the terrain, so there is little relief.

McPhetridge stated that the development of methods to better distribute elk in the winter and spring would be helpful. Also if tech-

niques could be developed to break-up large herds into smaller bands, the damage would be considerably less.

He felt that if cattlemen treated the public rangelands like the ODFW grazed elk, the cattlemen would lose all their permits and be removed from public lands.

Umatilla County

Louis Umbarger has private land on the South Fork of McKay Creek. This area is deer and elk winter range. There is some use of his private land by elk but deer use is heaviest. He has found that deer use in the summer is increasing, probably because of increased activity on the forest. Deer now remain on his private land year round. One of his main concerns was that rancher-hunter relationships were poor. Vandalism and shooting damage were increasing and there was a tendency by some ranchers to close their land to hunting.

Lou Levi of the Cunningham Sheep Company stated that elk damage was evident in the spring. Both trampling damage and heavy forage use occurred on private land. There are 1,000+ elk on their private land in the spring. Since elk numbers are increasing, damage to summer range is expected. He mentioned that game use on private land should be charged to the ODFW by the Animal-Unit-Month. He also mentioned that the ODFW has understaffed its biologists and that presently each biologist had too much territory to cover effectively.

Terry Anderson runs cattle on deeded and timber company land. Elk damage is worse in the spring after the snow first melts. Trampling damage is his greatest concern. Elk tend to leave his ranges early as they are more accessible to the public and increased human activity causes the elk to move off. However, the elk damage situation is variable depending on elk density and their specific distribution in

a given year. Haystacks do have to be fenced or paneled to prevent elk damage. Fences are somewhat of a problem but leaving all gates open in the fall has decreased that. Their land is open to hunting.

Deer on one of their properties are a problem. Use occurs most of the year on wheat fields. Trailing and the resultant erosion of the trails appears to be the greatest damage.

Jim Whittaker ranches south of Pilot Rock. January through March are the worst months of elk damage. Along with heavy forage use, soil compaction and fence damage occur. In 1978 heavy elk use began in November and continued through spring even though the ranch is located 3-4 miles from the nearest timber.

Whittaker felt that reductions in elk numbers were necessary. Elk management should be tied to available forage more closely. The construction of exclosures was suggested to better assess composition changes in vegetation caused by heavy spring elk use. He also suggested the study of costs to the rancher tied to wintering elk. He calculated a possible 20 percent reduction in cattle numbers on private land to maintain range condition with the high numbers of elk present. He questioned that Oregon may be the only state not to pay game damages. Whittaker stated that damages caused by sportsmen were increasing at an alarming rate and that there was a very poor attitude by the sportsman to the rancher.

Bob Lazinka is headquartered south of Pilot Rock and runs cattle on private and public land east of Ukiah. He stated that he has sustained severe elk damage to his private land in most years; both elk winter and early spring range and heavy use on private forested range used as the transitory range of elk (late spring).

Most of his input was limited to suggestions for research and monitoring of elk and the range. Big game should be managed by range trend more than by animal trends. The Oregon Cattleman's Association, Rancher-Sportsman Committee, would like to cooperate with the Forest Service and the ODFW to develop methodology to evaluate ranges and monitor forage use on various ranges. A better evaluation of range use by big game is needed. For instance, heavy elk use (consistent with the present over-population of elk) may lead to cuts in AUM's of livestock use on the forest. The Bridge Creek Management area serves as an example. Elk numbers of 1,200 are considered optimum but now there are 1,500 to 1,600 present. Lazinka would prefer that ODFW policy be more consistent in setting elk numbers in various areas and be more of a biological decision than a political one. He referred to the data listed in Table 4, specifically, where 1978 elk numbers in many areas exceeded the stated management objectives.

Grant County

Tom Swaggert has ranched near Ritter, between the Middle Fork and the North Fork of the John Day River, for the last 35 years. Elk were never common in that area at any time of the year until the last ten to twelve years. During this time period the herds have steadily increased. Elk are now common on this juniper range the year round. Large groups of up to 60 head are a common sight. Either the elk are less migratory or have expanded their range. Swaggert felt that increased activity on the summer range by logging, roading and recreation has disturbed the elk so that they now seek solitude on the lower elevation ranges to calve and then subsequently stay there for the entire year. Most of this is private land and good forage is available as well. Deer have begun to follow the same trend. However, Swaggert

did mention that elk on Forest Service Land in the Desolation Big Game Unit were in extremely high numbers and were the primary cause of meadow degradation.

During the winter of 1978-79 elk numbers were extremely large because of the heavy snow pack. He stated that many of the elk normally on the Bridge Creek Wildlife Management Area migrated around his ranch and increased the use. Deer on this range suffered extreme mortality. Most elk mortality was restricted to older cows and calves. Early spring use of forage on private land has been increasingly severe but the past winter was the worst. Soil disturbance has now been noticed due to the large numbers of big game.

Swaggert stated that rancher tolerance to big game was quite good but that the increase in resident populations and spring use would require some decrease in herd numbers. In fact most ranchers have had a strong positive attitude toward big game until the last few years. He suggested an extensive early season hunt west of State Highway 395 to decrease the resident elk herd. Therefore, more forage would be saved for the migratory herds of deer and elk. Improvements in survival of the migratory animals would result.

Grasshoppers have consumed much forage during the last two years. Increased spray programs would decrease mortality of big game in the winter. Swaggert stated that much of the deer die-off during the winter of 1978-79 could have been avoided if the grasshoppers had been sprayed. He felt that the ODFW should enter into cost sharing on spraying since benefits to big game were significant.

Trend counts conducted by the ODFW were undersampled and conducted in rather poor areas. He stated that this past winter's deer mortality was underestimated because deer did not use the area sampled. Areas

of high deer density and high mortality were not sampled.

Rancher-ODFW relationships are declining because the biologists are spending less time with the ranchers and are less sympathetic to their problems. He also suggested that ODFW sponsor some hunter education in terms of building an awareness to the limited forage resources and the impossibility of maintaining vast numbers of big game.

Swaggert's suggestions for research to improve forage allocation were to improve the trend count system, to define why elk distribution is changing (why do elk now spend the entire year in the juniper zone?) and to enhance winter elk distribution and survival by increased feeding of hay. He felt hay feeding to elk would be very effective based on observation on his ranch.

King Williams has a ranch on the south end of Grant County, south of Canyon City. His ranch operation includes summer grazing on low elevation Forest Service Range, that is becoming increasingly important as elk winter range, as ODFW management in this area has changed toward increasing elk numbers.

Summer cattle range is also elk winter range. In this area, elk winter on the lower elevation Forest Service ranges using the north slopes for cover and the south facing slopes for forage. The availability of forage on these slopes is limited. Most of the range has a rather dense overstory of ponderosa pine. Since the area has been included in RARE II, no range improvement (logging and subsequent forage reseeding) has been allowed. With increasing elk numbers, this has become a problem. A ten percent cut in cattle Animal-Unit-Months was initiated in 1979. Forage use by cattle is not even across the range because of the lack of water in many areas. Water development has not been allowed under the RARE II program. Therefore, overuse of

creek bottoms and poor cattle distribution are common.

Summer use patterns of elk appear to be changing too. Elk do not migrate to the Strawberry Mountain Wilderness Area like they have in the past. Williams suggested that forage composition changes caused by the absence of sheep grazing may be a cause.

Williams suggested that research should be directed towards improved timber and forage management to provide more forage on elk winter range. Reseeding would be an excellent method to improve elk winter range following logging. Forage availability was the key factor in this area. Because of limited forage, early spring elk use of hay meadows has been intense and increasing with the growing elk numbers.

Bob Sproul represents the area on the north side of the John Day River between John day and Dayville. Historically this has been a heavy use deer winter range. Most of the deer winter range is private land but he also owns higher elevation land which is intermingled with Forest Service land. Deer use his private low elevation range (primarily annual grassland) from November through April. Spring use when new growth starts is the worst. The ODFW has in the past had exclosures present and has measured utilization. He reports utilization as high as 90 percent of current annual growth in some years prior to cattle turn-out. During the drought of 1977, what little forage grew was immediately consumed by deer, leaving none for cattle.

With the management change toward increasing elk populations in this area, elk utilization of spring forage is an increasing problem. Elk also do not migrate off his private forested land to higher elevations as in the past. Therefore, summer elk use has increased greatly as has fence maintenance.

Decreasing deer use on private lands in the spring and determining

how many elk utilize the area and setting viable management goals are areas of concern mentioned.

Baker County

Fred Phillips runs cattle on private, Bureau of Land Management and Forest Service range in the Keating area. Livestock numbers in the area have been decreasing on the area over the last 50 years. However, deer numbers have increased 500 to 1000 percent. In the Keating and Lookout Mountain Big Game Units, about 60 percent of the land area is private. In some locales 90 percent of the available winter range is privately owned. Deer numbers are now in excess of the available winter range. Native range areas are the most damaged by overuse as deer do not prefer crested wheatgrass, the most commonly used species for reseeding. Phillips also states that the Keating deer winter range has made some improvement over past years when livestock numbers were higher.

Fall grazing on Bureau of Land Management land is by rancher discretion, in terms of electing to turn out allotted cattle. In the fall of 1978, Phillips voluntarily took a no-use on a deer winter range area because he felt there was not sufficient forage available. The area had not been grazed by cattle that spring.

On other points, Phillips mentioned that on summer range elk were not a problem. Fence damage has been a problem but changing over to lay-down fencing has remedied that situation. Deer use on croplands is tolerated. The primary concern is deer overuse of native ranges in the spring as the forage is greening-up. Elk use of sagebrush ranges in the Keating area is increasing in the summer and fall and may become an area of concern.

Research needs should be directed toward better censusing methods.

Forage allocation procedures should be improved by determining food habits of big game and cattle. Better evaluation of areas to be reseeded should also be considered. Methodology to improve the success of seedings is needed. Soil testing was given as an example.

Tim Kerns has a livestock-hay-grain operation on the eastern edge of the Elkhorn Mountains. Historically, this area has been a problem because of the absence of winter range. Elk density is high while deer populations are quite low. The mountains are not grazed by livestock and little timber is harvested. The best use of the mountain land is elk production, in Kerns' opinion. However, winter range must be provided. Elk use on private lands begin about August 1. When the mountain forage becomes dry, elk migrate down to alfalfa fields at night. The habit of elk to congregate in large numbers aggravates the problem. If grain fields are between the mountain and the alfalfa, there is much damage to ripening grain by the passage of elk through the fields. The drought year of 1977 was the worst when about 120 head of elk continually used his ranch as a feed source. In winter, haystack use is continual. Haystack panels have been used in the past but proved to be too labor intensive. Much time was spent putting up and taking down the panels, stacking and destroying broken panels and putting up wind-blown-down panels all winter. About one-third of the panels were destroyed by wind or elk each winter. Kerns said panel use was 10,000 dollars a winter. That money could be better spent to provide elk winter forage. Also, elk panel use just forced the elk to migrate further into the valley in search of unpanneled stacks. In some years, elk move almost to Haines in search of winter feed. Early

spring damage reported to be a problem elsewhere was not a problem on this ranch. However, ranchers in the area planting fall grains did have a problem. Elk used the wheatfields as early spring range.

Kerns felt that the ODFW has a responsibility to control elk damage to cropland and haystacks. The ODFW did little to prevent damage but did handle complaints. He stated that elk numbers were going to be drastically reduced in the area due to the absence of winter range. He is against this because the Elkhorn's best use is elk production. He feels that the ODFW can develop viable winter range alternatives if they work at it.

Priorities of research would include developing alternatives for winter range. The feasibility of construction of game fencing and winter feeding research were suggested. He stated that the ODFW has a policy whereby they will not feed elk on property they do not own. Ranchers would gladly feed the elk if hay were provided. He also suggested that the ODFW lease private land as winter feed grounds for elk. Problems between ranchers and the ODFW were not so much on the local level but with the lack of response and the policy setting of the Portland Office.

Union County

Heber Glenn ranches on the south end of Ladd Canyon. He reports elk damage from August through April and sometimes May. Summer and fall use is quite heavy on fall-seeded grains and alfalfa. In winter, haystack damage is a common occurrence. Spring use occurs on fall grain and on private native range. Trampling damage as well as forage use is a problem. Fence repair due to elk damage is about \$2,000 annually. Deer are present on his ranch but he is quite tolerant of them. During the winter of 1978-79, 86 elk were trapped out, but 85 remained.

Compensation for destruction would be less expensive than trapping expense, in Glenn's estimation. Herd levels will increase again quickly anyway. Emergency feeding programs were erratic and ineffective. In the past, better elk feeding programs were used.

Research should include better winter management of elk and the possibilities of extensive winter feeding. Better distribution in the spring should be a high priority item as well.

Wilbur Smith runs a cattle operation in High Valley. Elk use his land year round. There are 80 to 85 head of elk using alfalfa, oats and apples in the summer and fall; haystacks in the winter; and native range in the spring. Hunting pressure does little to move the elk. Fall seeded grains are grazed in the fall, spring and again as the heads are forming. Damage occurs from consumption, trampling and bedding. Fences are also continually damaged. Native range is definitely set back in the spring. Depending on the intensity of elk use, deferment of cattle is necessary. Deer are a problem at this time too. Fall grazing on some fields has to be managed around the elk as the elk may beat the cattle to the best forage. Despite the problems mentioned, Smith feels the elk are a part of the system and he "lives with them". Compensation for damages is a possibility but administration of such would be extremely difficult.

Possible research projects would be methods to force elk migration to higher elevations in the summer and early fall. Hunting pressure in the fall has little effect; the elk still graze the fields at night.

County Extension Agents

Wallowa County

Dave Dickens stated that elk were the primary concern of the county's ranchers in terms of forage allocation. The high density of

elk on private land in the winter and spring was the greatest point of concern. Damage to young trees on private land during this same period is also a problem. Improving elk distribution during all times of the year was mentioned as a high priority research item.

Umatilla County

Fred Kerr has found forage utilization and trampling damage by elk on private land in the winter and early spring to be the most commonly voiced problem mentioned by ranchers. The winter of 1978-79 was particularly bad because of the extensive snow cover. Elk wintered on ranges which they had previously not occupied and remained longer on spring ranges.

Privately owned forest land at intermediate elevation that acts as transitory range between winter and summer has been increasingly used by elk; both in intensity and duration. Soil compaction due to trampling is as much of a concern as is forage utilization.

The study of areas excluded from grazing on privately owned winter range areas is suggested. These exclosures would exclude both cattle and elk while others would exclude elk only; then have a system (perhaps lay down fence) whereby normal cattle grazing would occur. Soil changes and forage composition and production would be monitored.

Research should be conducted to determine the validity of current census methods and perhaps the development of more accurate techniques. Methodology for improving elk distribution or dispersing large groups is another priority item.

Grant County

Fred Otley related forage allocation problems between livestock and big game in Grant County to poor range conditions and lack of for-

age on forested ranges. Deer winter ranges are in poor condition. Bitterbrush, one of the primary forage species is in poor condition due to overbrowsing. Invasion of juniper has further decreased the availability of bitterbrush and other forages.

On summer ranges much of Grant County needs proper logging to leave needed cover but also to open some timber stands to provide more understory forage. There is a potential to maintain deer numbers and increase elk numbers with little influence on cattle production if range improvements are initiated. Summer range improvements and the enhancement of forage availability will allow deer and elk to enter the winter in better condition and should decrease mortality. Improvements on transitory ranges may help to pull deer and elk off spring ranges on private land and decrease rancher intolerance to large numbers of game animals on their lands in the spring.

Because ODFW policy has changed to increase elk numbers in the south end of the county, increasing available forage is a high priority item. Otley also suggested that food and cover requirements of deer and elk on winter range be studied; present ideas may be overestimated.

Baker County

Peter Markgraf stated that most ranchers did not mind winter forage use by big game. However, as the forage greens-up in the spring, ranchers would prefer that big game grazing decrease substantially. Rancher intolerance to this situation may stem from public land management policy of preventing early turn-out of cattle and stressing the importance of spring deferment to prevent physiological damage to the forage. It is hard for a rancher to accept this concept and then see large numbers of big game grazing private and public lands in the spring with apparently little concern by management agencies. Damage

to croplands and haystacks is also an ongoing concern of Baker County ranchers. The question was raised: "Who pays the bills for maintaining big game on private lands and then who derives the benefits?" The winter range on the east side of the Elkhorn Mountains is limited; distribution of elk is quite poor.

Research needs suggested by Markgraf are:

- 1) What are habitat and spatial requirements of big game?
What is the relationship between livestock and big game on summer range in terms of the social aspects - how many deer or elk will leave an area with each increment of livestock stocking?
- 2) What types of cover and forage and in what quantities are required of big game seasonally?
- 3) What composition of forages do we need to optimize mixtures of various ungulates - and can we manage for this?
- 4) What overall conditions are required for the various aspects of big game fawning, calving, breeding and winter maintenance?
- 5) What factors are present or changing causing elk to diversify their ranges - less migration to higher elevations; the summer presence of elk in cropland areas; the presence of elk in sagebrush ranges year round?
- 6) What are the influences of various habitats on big game and in what percentages are they required?

Union County

Ralph Hart presented the results of a rancher survey listing damage incurred by big game (Table 2). Hart recognized that private lands are

Table 2. Value of big game damage to private lands in Union County

Type	Dollar Loss
Grain	\$ 8,550
Hay	12,700
Other Crops	2,600
Pasture - Deer	22,550
- Elk	57,770
Repairs and related costs (Fencing, gathering loose cattle, etc.)	11,680

primarily responsible for the maintenance of game herds. Most winter ranges are on private land and this is the critical period for big game survival. Rancher tolerance to big game on private land has decreased as a result of poor hunter etiquette. Improvements in sportsman-rancher relations are needed.

Food habits research on a seasonal basis should be expanded as this is the key to forage allocation. Determination of the real effects or trampling on the soil and vegetation should be accomplished.

Oregon Department of Fish and Wildlife

Game Biologists of the ODFW in Wallowa, Umatilla, Grant, Baker and Union Counties and the Northeast Region Habitat Biologist were interviewed. Bob Stein in the Main Office in Portland was contacted and interviews with staff members there were held.

Wallowa County

In Wallowa County, Vic Coggins stated that forage allocation problems occur on all seasonal ranges. Deer and elk damage to croplands occurs as well. Elk damage to cultivated crops is particularly bad in the Flora area.

Elk use and distribution in the early spring is the most critical problem. Since early spring use is primarily on private land, elk numbers must be managed by how much early grazing ranchers will tolerate. It was suggested that some areas of public land adjacent to private land be managed for winter and spring range, where possible, to alleviate the heavy use on private lands.

Summer range areas also pose forage allocation problems. Some areas of public land are heavily grazed by cattle. Adjacent private lands are generally in better range condition. Also, increased activity on public lands, due to increased roads and recreation, have caused the

elk to move onto private lands to escape harrassment. Due to these factors, elk use in the summer and fall is increasing on private lands.

Presently the ODFW does not have sufficient manpower to quantitate vegetation trends on important ranges; analysis has been empirical.

Coggins suggested several areas of needed research:

- 1) Quantification of food habits of both cattle and elk.
Concomitant with this, forage production should be measured to more properly ascertain forage allocation.
- 2) Methodology development for better distribution of cattle and elk would also be beneficial, particularly on winter and spring ranges. The use of salt was suggested.
- 3) Nutritional availability of forage for deer and elk during all seasons should be determined.
- 4) A suggested area for research was on the Snake River Divide where cattle and elk exclosures are already present.

Umatilla County

According to Don Wilt, the major impacts on elk that have caused forage allocation problems, in Umatilla County, are the availability of winter range and poor distribution due to logging practices. The southern half of the Ukiah Game Management Unit is primarily public land winter range, while the northern portion is primarily private land. Winter range on the Walla Walla Unit is primarily private land.

Forest Service Management Plans call for the optimum management of wildlife habitat, providing there are no conflicts with the allowable cut of timber. Forage allocations have been made but with little input from ODFW. An excess of 90 percent of the land area has been

allocated to timber harvest first. Timber harvest has produced an increase in forage on many areas of summer range. However, the cutting of grand fir sites that are normally densely timbered has decreased the availability of hiding and thermal cover so that poor elk distribution has resulted. The Wallowa-Whitman Environmental Impact Statement calls for the maintenance of 40 percent cover for elk, but timber management plans do not allow for it. The time spans for forage and cover recovery, following logging operations in specific areas have not been considered; cattle allotments are displaced and elk distribution patterns are changed. Also, logging operations have been conducted on or adjacent to winter ranges. Again, elk distribution and range use patterns have been drastically altered.

Wilt described the effects of timber harvest practices. Logging on winter ranges that were considered insignificant, only because small numbers of elk were present (less than 100), has caused these groups to congregate in larger numbers but in reduced land areas. Of 9,000 elk on winter range, 85 percent now graze private lands because of the disruption of their normal winter range due to logging. In the Ukiah area, because of poor elk distribution and congregation near the remaining cover, decreased elk calf crops have been noted. Heat stress may also be a factor. On the Whitney-Ukiah summer range there has been an increased movement of elk to private range to seek cover. Decreased cattle and elk production has resulted due to decreased forage availability. In some areas of Forest Service Land, fescues have been reseeded following logging. Fescues are rather unpalatable grasses and are not consumed until most of the other available forage is utilized. The continued displacement of elk onto private lands has to impact cattle production negatively because of poorer forage conditions.

Forest Service timber harvest plans in Umatilla County do not allow for continued elk production.

Grant County

Ralph Denney has found that the primary concern in Grant County has been winter range for deer. Elk numbers have been increasing in the southern portion and problems involving elk have yet to occur. The Middle Fork of the John Day River has previously been the demarcation line. South of the river was considered deer range and managed as such while north of the river was considered elk range.

Deer winter ranges are broken into three categories: Grass (75% grass composition), mixed (50% each grass and browse composition) and browse (75% browse composition). Deer densities per mile of winter range are managed as to the type of range. Carrying capacities are based on the available forage to carry deer through a three week period of snow cover and temperatures of 0° to $+10^{\circ}\text{F}$ and rancher tolerance to deer, as much of the winter range is on private land.

About 80 percent of the winter range is private with some Bureau of Land Management land intermingled. The Murderer's Creek Deer Winter Range is an exception as it is ODFW land. Bunchgrass winter ranges are little impacted by deer. As snow cover increases deer move to the annual grass-shrub ranges. On these ranges deer can consume up to 45 percent of their diet on Sandberg's bluegrass. These ranges are commonly grazed by cattle at the rate of 50 to 80 acres per Animal-Unit-Month (AUM). Deer use on this quality range can definitely have an impact on cattle grazing. On the Murderer's Creek Management Area, management has been to increase the vigor of the range. In four years there has been a ten fold increase in forage production. However, cattle are used to manipulate the forage so that climax is not reached and a suitable plant cover

of shrubs and forbs exists for deer forage. Fall cattle grazing is not allowed to prevent cattle consumption of shrubs.

Elk numbers are increasing south of the Middle Fork of the John Day River. Past hunting pressure has concentrated on deer here, but is now shifting toward elk. Elk numbers have tripled since 1976. Most of the elk winter range (80%) is on public land and is bunchgrass range. An altitudinal gradient exists so little conflict with deer winter range is expected. There have been seven major elk winter ranges identified. However, where elk will continue to winter and what impacts they will have has yet to be determined.

On summer ranges, Denney identified only one area of present concern. On rest rotation cattle management systems, elk tend to congregate on the deferred or rested pastures, particularly on the riparian zones. Riparian use by elk may become a problem, as well as forage use on rested areas, since the rest does not actually occur. Management needs that could be met by research include the impacts of fall livestock grazing on browse availability to deer on winter range. Also, the impact of feral horses on the Murderer's Creek Area needs to be explored. Denney did not voice much concern for food habits or nutrition oriented research.

Baker County

Richard Humphreys related some of the problems in the Baker County area. Several key areas of both summer and winter range were subjected to overuse by livestock. Late fall cattle grazing on deer and elk winter ranges was a problem because cattle consumed the fall green-up forage necessary for big game. The Whitney Valley was given as an example. The herds existing in the Elkhorn Mountain Range suffered from a lack of winter range. For 180 square miles of summer range, there

was virtually no winter range. The lack of winter range was particularly acute on the eastside of the Elkhorn Range.

Research needs included methods of management for desirable quantities and quality of winter range forage, and particularly manipulation of specific plant species composition on winter range.

Union County

Mike Kemp notes that in Union County one area of primary concern was the condition of deer coming off summer on the south end of the Wallowa-Whitman National Forest. Relatively large pastures (about 6,000 acres) have been put into rest rotation grazing systems. Deer on summer range do not maintain a very large home territory and probably stay within many of these pastures. During years of season long intensive livestock use under rest rotation deer condition may suffer. It has been noted that deer going onto the Keating deer winter range vary tremendously in body condition. A 45 percent mortality in fawns going onto winter range has also been noted. Intensive livestock use under rest rotation may be the contributing factor due to limited forage availability later in the summer and fall.

The elk population on the Bridge Creek Management Area continues to expand. Calculated grazing capacities should be formulated and perhaps applied to other areas as well.

Winter and spring use by elk on private lands grazed in spring and fall by cattle is a primary concern. Competition for forage does exist on several elk winter ranges in the county.

Logging operations in the western portion of the county have caused habitat losses on some ranges. Better planning of timber harvest and minimums for cover should be established.

Ideas for research include correlating physiological conditions of big game and nutritional availability of forage. Methods such as burning and/or fertilization should be studied to improve the production of fall regrowth on winter ranges. Methodology for the diversion of big game away from croplands on both winter and summer ranges needs to be developed. The use of salt as a distribution aid and mineralized salt as a nutritional aid should be researched.

Regional Habitat Biologist, La Grande

Jack Melland mentioned that cattle grazing on elk winter range can be beneficial. The experience on the Bridge Creek Wildlife Management Area serves as an example. Twenty percent of the forage there is allocated to cattle. Better coordination of livestock and big game grazing on public land winter ranges should occur. Of the available forage, a total of 40 percent should be used, with 50 percent each of that going to cattle and big game. Winter ranges are a problem due to poor distribution of animals. Also, harassment by the public on public lands often forces increased big game use on private lands.

On summer ranges the harassment factor is increasing greatly. Elk are seeking refuge on private lands. There is a need for more road closures on public land; some should be year round.

Some land acquisition by the ODFW should continue as a means of relieving pressure of winter game use on private lands. Winter feeding of game herds may have to be increased if complaints continue. On two tracts in the foothills of the Elkhorn Mountains about 525 elk are fed annually. On the Troy Management Area 400 tons of hay were fed last winter. There may also need to be some game fencing done in selected areas to prevent overuse of private lands in the winter and spring.

Research needs should be programmed to look at basic seasonal nutritional requirements versus availability. Distribution of big game on winter ranges should also be studied.

Portland Staff

Paul Ebert and Del Sanford, Staff Biologists, were interviewed jointly in the Portland Office. The ODFW has now developed through local biologists, Management Objectives for each big game unit. Numbers of mule deer and elk optimum to each area have been estimated based on forage available, competition for forage and for the best level of management. Management Objectives are subject to change with changes in the forage resource or as new pertinent data are obtained.

Winter and spring ranges have been identified as problem areas because of ownership patterns and use by livestock. Summer ranges may be or may become a problem. This is a good avenue of research.

The Keating deer winter range continues to be a problem area. Means of range improvement need to be studied. Observation of ranges adjacent to land acquired for winter game ranges need to be assessed to see if acquired land management has decreased the impacts of big game on the surrounding private lands.

Specific research needs were listed by the two biologists. Improvement of body condition indexes used on winter ranges could be improved to get a better idea of survival or survival potential. The nutritional needs of big game on a seasonal basis needs to be explored. Deer and elk population cycles and their causes are points that need clarification. Winter requirements for food and cover have been observed but further work needs to be done.

Forest Service PersonnelWallowa-Whitman

Rod Miller, Staff Wildlife Biologist, suggested that forage be allocated to wildlife first on Forest Service lands. Big game numbers, as suggested by the ODFW Management Objectives, would be the optimum game numbers applied. Livestock would then be allocated the remaining forage to proper use. As long as the Management Objectives numbers were not exceeded, any cuts necessary, due to declining forage conditions, would be made in livestock. The first priority of management would be range condition and trend, and proper use.

Presently, Forest Management Plans call for giving big game priority on certain parcels of land.

Miller listed some areas of concern. Even though winter and spring big game ranges were not on Forest Service lands in most cases, winter range is a high priority item. The Imnaha and Snake River areas were exceptions, where winter range existed on Forest Service land. Riparian zones on summer ranges are receiving heavy use by both big game and livestock.

Elk use in early spring is an area of concern. The lack of easy access to the Imnaha and Snake River areas sometimes makes adequate harvest impossible. Also spring and fall cattle range is often winter and early spring elk range. Manipulating cattle grazing on these ranges to provide elk forage is a priority research item. Concomitant with this should be research on winter range improvement practices designed to make more forage available.

Big game censusing techniques should be improved upon. Forage plants preferred by each species of herbivore should be identified by season.

Bob Bamberg, Staff Range Conservationist, stated that the greatest degree of conflict with forage allocation was between cattle and elk. He feels that more definitive policies regarding elk are needed. In areas of conflict for forage, are cattle numbers to be maintained and the elk numbers cut? Should elk thermal and hiding cover receive a priority consideration on timber sales? Elk numbers in the Chesnimnus and Snake River Big Game Units may be too high now due to the restrictive hunting seasons in those units.

Several avenues of research were proposed by Bamberg:

- 1) Elk distribution techniques would be an excellent research objective. Salt put out for livestock definitely draws elk; but will salt placement move elk in the winter?
- 2) Various studies should be conducted to see if elk can be managed by any means on rangeland.
- 3) The influence of various cattle grazing systems on elk movement and distribution and possible overuse of riparian zones is an important problem.
- 4) Basic studies regarding the influence of early spring elk use on the depletion of carbohydrate reserves in forage plants and the influence on subsequent forage production.
- 5) The number one research priority would be to identify areas of cattle-elk conflict and quantify them. Along with this, aspects of distribution and food habits of each should be identified.

Umatilla

Roger Baker, Staff Wildlife Biologist and Walt Johnson, Staff Range Conservationist, were interviewed jointly. Presently there are about 33,000 elk that use the Umatilla National Forest as summer range.

Most of the winter range is off the Forest Service land and on private land. Forage allocation for cattle and elk is the most severe problem.

On the Desolation Big Game Unit, it has already been determined that summer forage is limited and no increase in numbers of elk or cattle should occur. In other areas the actual carrying capacities of elk late spring and summer range are not known. However, on both cattle allotments, perhaps 40 percent of the area is not used by cattle. Means of quantifying this by allotment would help in allocating forage.

Food habits of cattle, elk, deer and sheep (sheep numbers are increasing) would be useful data in allocating forage. Also, the determination of proper use on key forage species by cattle and elk is needed. Season of use and its influence on proper use must be considered as well.

Trampling damage is an often cited phrase but research should be done to look at the long term impacts of trampling on spring range by elk. Are soils significantly compacted and are the effects more than short-term?

Malheur

Warren Current, Staff Wildlife Biologist, stated that forage-cover relationships were extremely important to both deer and elk. On the Forest Management Plans some areas call for optimum wildlife habitat management, with timber and cattle considerations secondary. The land so allocated varies by planning unit; one area has only 12 percent while another has 45 percent allocated to wildlife as the primary use. What little winter range is located on Forest Service land, is not all included in the optimum wildlife habitat category at this time. Deer numbers have been near maximum for the past few years based on current

winter range conditions. Elk numbers have been increasing with the change in policy of the ODFW. Carrying capacities of the summer and winter ranges are not known at this time.

At the present time forage allocation is based "on the whole". Consumption of specific plants by specific animal species is not considered. For example, wildlife may be allocated 10 percent of the total forage production. Basic knowledge of seasonal food habits of the various herbivores is needed to better allocate forage.

Current also listed various other research needs. Grazing systems appear to influence elk distribution. The influence of grazing systems on elk distribution and forage use, particularly in the riparian zones should be studied. Winter range use by livestock and big game should be observed as well as developing forage manipulations or range improvements on winter ranges. It was suggested that such gathered information be placed in a management guide such as Hall's plant community publication.

Region 6 Staff

Clarence Allman, Range Conservationist and Rod Canutt, Wildlife Biologist were interviewed jointly. Both men listed areas of concern in Eastern Oregon. Elk numbers have been increasing in the area of the Bridge Creek Wildlife Management Area for some years. Summer range may become a critical factor. Most importantly though, is the concern with trampling damage; and if indeed trampling does cause soil compaction. Elk numbers in the Snake River Unit are building due to the 3-point bull limit imposed on hunting. Impacts on forage allocation here may increase. Management Objectives developed by the ODFW were done so without enough input from the Forest Service. Since most big game summer ranges and some winter ranges are on Forest Service administered

lands, greater input should have been obtained.

In Wallowa County there is a need to look at the entire annual spectrum of elk and cattle use. Elk numbers appear to be large enough so that summer forage is limited on ranges where cattle and elk graze the same area. Grazing systems seem to alter patterns of elk use so that areas rested from cattle use are grazed heavily by elk.

Areas of possible research included the influence of grazing systems on the forage utilization and distribution of elk. Improvement of shrubs available on deer winter ranges is needed. Exclosures located in various pastures of Eastern Oregon should be read and the data interpreted. The relationship between high animal density on early spring ranges and soil compaction should be explored.

Isaac Walton League

Loren Hughes, representative, was concerned with the extensive road construction plans of the Forest Service in conjunction with timber harvest. On the Wallowa-Whitman Forest alone, if current plans are put into effect, there will be 12,038 miles of roads in 15 years. Roothing to this extent will remove large tracts of land from timber and forage production. Also, the harrassment factor will remove additional lands adjacent to the roads from wildlife habitat and decrease the available range to deer and elk. Forage allocation problems will increase. Private lands, with less roading, may receive even heavier big game use.

Winter ranges are definitely a problem. Improved cooperation between the private land owners and public land administrators is needed to coordinate big game use and perhaps distribute it better. Artificial feed should be avoided if possible. Damage claims may be feasible in some circumstances, but they would be very difficult to administer.

Land acquisition of key winter range areas appears to be a viable alternative.

Research should be directed toward improving distribution of livestock and big game and improved efficiency of forage use. Displacement of wildlife on public land due to roading, harrassment and other factors is a key issue that requires attention.

Bureau of Land Management

Matt Kniesel, Wildlife Biologist on the Baker District stated that many deer winter ranges in the area were at least partially on BLM land. BLM, ODFW, private land owners and Forest Service personnel need to act together for a coordinated total management plan for deer.

Kniesel listed several research needs. He suggested the study of food habits, forage availability and nutritional quality, and distribution for deer and cattle. Research in habitat improvement should be continued and expanded. Deer distribution and habits in winter with varying weather conditions have been observed, but again, more data are needed. There is a need to establish criteria for the evaluation of habitat manipulation and improvement. Evaluation of the summer range and the extent of its influence on deer winter survival is an important topic.

Wyoming Department of Fish and Wildlife

Charles Oakley, Game Warden, WDFW, was contacted to develop another viewpoint from a state that has large big game numbers and limited winter range. Providing forage for big game in the winter has been a continuing problem in Wyoming. Extensive feeding programs are underway. However, the best system appears to be land acquisition of key winter range areas and managing forage on these tracts for big game. In some

areas, game proof fences have been installed to keep animals on these lands and prevent migration to lower elevation croplands. Damage claims are paid by the WDFW for haystack and standing crop damage (cultivated lands only). Final dispensation is by observation and assessment by WDFW personnel.

Oregon Rangelands Committee Meeting

On June 4, 1979, the Oregon Rangelands Committee met in Portland. Part of the agenda was the problem of forage allocation for big game and livestock in eastern Oregon. Therefore, a summary of the discussions of various personnel involved is included in the Interview Section.

Chairman, Dick McElligott suggested that forage allocation and land use be tied to a Coordinated Resource Management Plan concept and to County Planning Commissions. Dan Eastman and Paul Ebert of the ODFW presented the idea behind and the basis for the newly developed Management Objectives for mule deer and elk.

Responding to these comments, Bob Lazinka, representing the Oregon Cattlemen's Association, stated that in some areas, herds were already in excess of the Management Objectives. Management Objectives were formulated by the biologist in each area; he may or may not develop a viable plan. Lazinka suggested that MO's be formulated jointly by ODFW, USFS and involved ranchers.

Fred Ringer, Baker County, stated that in his county private land comprised 50 percent of the land base. Most of the private land was big game winter range. He sees big game as trespassers. The ODFW should calculate its big game carrying capacities based on public land acres only.

Stuart Sullivan, Baker County Commissioner, stated that ODFW regulations and hunting seasons did not necessarily follow local biologists'

recommendations. Private land owners should have the right to regulate the numbers of big game on their land and be compensated for providing forage, especially in the spring.

George Schroeder of the Oregon Woodland Association stated that complaints against big game damage to tree seedlings were increasing.

Roy Mann, Soil Conservation Service, suggested that Coordinated Resource Management plans be utilized on ranches that were grazed extensively by big game.

Bob Lazinka suggested that the Oregon Rangelands Committee form a sub-committee to:

- 1) Develop, in conjunction with ODFW, a procedure that would allow local units of government and citizen groups to participate in the process by which goals for big game herd population levels are derived.
- 2) Develop a recommendation for a method of monitoring rangeland condition with respect to big game utilization. Such a method would involve SCS and OSU Extension personnel.

The suggestion was adopted.

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